PSE&G Public Service Electric and Gas Company

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Robert L. Mittl General Manager
Nuclear Assurance and Regulation

September 10, 1984

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

Attention: Mr. Albert Schwencer, Chief
Licensing Branch 2
Division of Licensing

Gentlemen:

HOPE CREEK GENERATING STATION
DOCKET NO. 50-354
POWER SYSTEM BRANCH

Pursuant to the meetings held on September 6 and 7, 1984, with R. Giardina of the Power System Branch (PSB), the responses to PSB Open Item 23 and the FSAR Questions listed in Attachment 1 have been revised and are enclosed for your review and approval (See Attachment 2).

The revised FSAR question responses are scheduled to be incorporated into Amendment 8 of the HCGS FSAR.

Should you have any questions or require any additional information on these responses, please contact us.

Very truly yours,

R L Mittl / R P Douglas

B001 1/1 Limited Dist

Attachments

C D. H. Wagner
USNRC Licensing Project Manager

W. H. Bateman
USNRC Senior Resident Inspector

MA 19 01-A

ATTACHMENT 1

Question No.	Section No.
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MA 19 03-A

ATTACHMENT II

PSB Item 23

HCGS Standby Diesel Generator Fuel Consumption

The following information will be added to the HCGS FSAR Section 9.5.4.2 in a future amendment:

> The standby diesel generators installed at HCGS use Colt 2.3 12-Cylinder engines which have a maximum fuel consumption rate of 5.2 gpm at the diesel's rated load of 4400KW.

QUESTION 430.62 (SECTION 8.3)

Periodic testing and test loading of an emergency diesel generator in a nuclear power plant is a necessary function to demonstrate the operability, capability and availability of the unit on demand. Periodic testing coupled with good preventive maintenance practices will assure optimum equipment readiness and availability on demand. This is the desired goal.

To achieve this optimum equipment readiness status the following requirements should be met:

1. The equipment should be tested with a minimum loading of 25 percent of rated load. No load or light load operation will cause incomplete combustion of fuel resulting in the formation of gum and varnish deposits on the cylinder walls, intake and exhaust valves, pistons and piston rings, etc., and accumulation of unburned fuel in the turbocharger and exhaust system. The consequences of no load or light load operation are potential equipment failure due to the gum and varnish deposits and fire in the engine exhaust system.

2. Periodic surveillance testing should be performed in accordance with the applicable NRC guidelines (R.G. 1.108), and with the recommendations of the engine manufacturer. Conflicts between any such recommendations and the NRC guidelines, particularly with respect to test frequency, loading and duration, should be identified and justified.

3. Preventive maintenance should go beyond the normal routine adjustments, servicing and repair of components when a malfunction occurs. Preventive maintenance should encompass investigative testing of components which have a history of repeated malfunctioning and require constant attention and repair. In such cases consideration should be given to replacement of those components with other products which have a record of demonstrated reliability, rather than repetitive repair and maintenance of the existing components. Testing of the unit after adjustments or repairs have been made only confirms that the equipment is operable and does not necessarily mean that the root cause of the problem has been eliminated or alleviated.

4. Upon completion of repairs or maintenance and prior to an actual start, run, and load test a final equipment check should be made to assure that all electrical circuits are functional, i.e., fuses are in place, switches and circuit breakers are in their proper position, no loose wires, all test leads have been removed, and all valves are in the proper position to permit a manual start of the equipment. After the unit has been satisfactorily started and load

tested, return the unit to ready automatic standby service and under the control of the control room operator.

Provide a discussion of how the above requirements have been implemented in the emergency diesel generator system design and how they will be considered when the plant is in commercial operation, i.e., buy what means will the above requirements be enforced. (SRP 8.3.1, Parts II & III).

RESPONSE

1. Minimum load requirements for SDG testing will be identified in OP-SO.KJ-001, Diesel Generator Operation. Add Insert 1

2. See response to Question 430.15.

3. A comprehensive preventive maintenance (PM) program (for the SDG incorporates) ~~is currently being developed and this program will consist of~~ the latest vendor recommendations and the requirements of Chapter 16. One SDG can be taken out of service, in accordance with 8.3.1.1.3, enabling periodic maintenance and/or rework to be performed. ~~in a timely manner. Additionally, a reliability monitoring program will be~~ insert B → ~~implemented to monitor and trend repetivive equipment and/or component failures.~~ In this manner, the root causes of system (or component) malfunctions can be more readily identified and corrective actions taken as necessary.

4. The supervisor in charge of the work will verify for completeness, and administrative controls will be implemented to ensure the system is restored to its operable condition prior to any start, run, or load test on the SDG.

The following procedures will reference this topic:

MD-PM.KJ-001(Q)	Diesel Engine PM
MD-PM.KJ-002(Q)	Starting Air System PM
MD-PM.KJ-003(Q)	Generator PM
MD-CM.KJ-001(Q)	Diesel Engine Overhaul and Repair
MD-CM.KJ-002(Q)	Starting Air Compressor Overhaul, Repair and Replacement
MD-CM.KJ-003(Q)	Generator Overhaul and Repair

Station Administrative Procedures 17, 21, 22, 23, and 26, as discussed in Section 13.5.

Add insert A.

Insert 1

Loading requirements will incorporate the diesel engine manufacturers' recommendations to preclude gum and varnish deposits on engine components or the engine exhaust system.

Insert ~~2~~ B 430.62

Additionally, a reliability monitoring program will be implemented at HCGS. The HCGS reliability program enhances SDG reliability by:

1. Analyzing machinery history record for recurring problems or failures of the SDG or supporting auxiliary systems or components.

2. Tracking operating experience reports, circulars, letters and notices of failure or problems given to all diesel generators.

3. Use of the NPRDS data base system.

4. Analyzing surveilliance testing results.

These functions are an ongoing and continuous responsibility of the Technical Department. Items which may adversely impact the safety function of the diesel engines at the station will receive immediate attention to determine a plan of action. Routine feedback issues are reviewed as received. All material reviewed as part of the feedback program is tracked on a computerized tracking system to ensure material is reviewed and dispositioned.

Insert ~~2~~ A   430.62

These maintenance procedures will incorporate the manufacturer's recommendations for loading the diesel engine above 50% capacity for a 1 hour period if engine ~~troubleshooting required either:~~ runs for:

1. 24 hours continuous operation at less than 20% capacity,

2. 12 hours intermittant operation at less than 20% capacity.

QUESTION 430.63 (SECTION 8.3)

The availability on demand of an emergency diesel generator is dependent upon, among other things, the proper functioning of its controls and monitoring instrumentation. This equipment is generally panel mounted and in some instances the panels are mounted directly on the diesel generator skid. Major diesel engine damage has occurred at some operating plants from vibration induced wear on skid mounted control and monitoring instrumentation. This sensitive instrumentation is not made to withstand and function accurately for prolonged periods under continuous vibrational stresses normally encountered with internal combustion engines. Operation of sensitive instrumentation under this environment rapidly deteriorates calibration, accuracy and control signal output.

Therefore, except for sensors and other equipment that must be directly mounted on the engine or associated piping, the controls and monitoring instrumentation should be installed on a free standing floor mounted panel separate from the engine skids, and located on a vibration free floor area. If the floor is not vibration free, the panel shall be equipped with vibration mounts.

Confirm your compliance with the above requirement or provide justification for noncompliance. (SRP 8.3.1, Parts II & III).

RESPONSE

All of the safety related instrumentation for the HCGS diesel generator controls, with the exception of the sensors or equipment that must be directly mounted on the engine or piping, are installed in floor mounted control panels removed from the engine skid.

Insert A

All of the instrumentation and control equipment used in these applications are carefully selected for use by Colt Industries for the expected vibrations associated with diesel equipment. Their use in the HCGS units is based on satisfactory performance proven in other similar nuclear power plants.

In addition, all process and control connections leaving the engine skid have flexible couplings. The diesel manufacturer does vibration testing of all skid units during their break-in shop testing to assure proper rotational balancing measured against response of similar previous skid units.

INSERT A

430.63

Colt Industries has confirmed that the only sensors on the diesel skid unit are those which must be mounted on the engine or associated piping, as excepted by the second paragraph of question 430.63. These sensors consist of temperature and pressure sensing switches, level and flow switches, and pneumatic transmitters. No vibration sensitive instrumentation is used or provided by Colt. Relays and other control devices are in control panels which are not mounted on the engine.

The instrumentation that is mounted on the skid unit is qualified per Colt's 1E Qualification Program in accordance with IEEE 323 and considers the expected engine induced vibrations. This instrumentation includes 15 pressure switches, 13 temperature switches, 3 limit switches, 4 solenoid valves, 2 RTD's, 9 CT's & 17 thermocouples.

Vibration amplitudes measured on prototype PC-23 engines are properly reflected in the qualification of the components.

QUESTION 430.65 (SECTION 9.5.2)

The information regarding the onsite communications system (Section 9.5.2) does not adequately cover the system capabilities during transients and accidents. Provide the following information:

a. Identify all working stations on the plant site where it may be necessary for plant personnel to communicate with the control room or the emergency shutdown panel during and/or following transients and/or accidents (including fires) in order to mitigate the consequences of the event and to attain a safe cold plant shutdown.

b. Indicate the maximum sound levels that could exist at each of the above identified working stations for all transients and accident conditions.

c. Indicate the types of communication systems available at each of the above identified working stations.

d. Indicate the maximum background noise level that could exist at each working station and yet reliably expect effective communication with the control room using:

   1. the page party communiations systems, and

   2. any other additional communication system provided that working station.

e. Describe the performance requirements and tests that the above onsite working stations communication system will be required to pass in order to be assured that effective communication with the control room or emergency shutdown panel is possible under all conditions.

f. Identify and describe the power source(s) provided for each of the communications systems. (SRP 9.5.2; Parts II & III).

RESPONSE

Insert A

a. ~~The identification of all working stations where it may be necessary for plant personnel to communicate with the control room during and/or following transients and/or accidents is not provided because all necessary plant shutdown controls and indications are located within the control room which precludes necessity of having plant personnel located at any particular station. If, however, plant shutdown is controlled~~

from the emergency shutdown panel, then it may be necessary to have plant personnel able to communicate from three working stations which have backup controls and indications. These three stations are at the diesel generator remote control panels rooms (4 total), the Class 1E switchgear rooms (4 total), and at the reactor protection system (RPS) motor generator set area. In the event of fires, the fire brigade reports to the affected area(s) and the areas are listed in Section 9.5.1.2.15.

b. Maximum sound levels have not been defined for the above working stations. The effectiveness of the communication system(s) will be demonstrated during the preoperational and power ascension test programs of Chapter 14. Insert B

c. The page party communication system is available at or nearby the above working stations. In addition, a two-way radio communication system is available as a backup system. Insert C

d. ~~The maximum background noise level that could exist at the stations for communicating with the control room has not been established.~~ The communications systems provided on HCGS are of proven design as used in previously approved plants. In addition, the communication system will be tested as described in Part (e) of this response. Insert D

e. See response to Question 430.68, communication systems performance requirements and tests. In-plant communication tests are also described in Section 14.2.12.1.38. The test method states that communication is checked between the control room and the remote shutdown panel. Insert E

f. The power source to the page party communication system is from an uninterruptible power supply feeding the public address system distribution panel 10D496 which in turn supplies the public address system cabinet 10C685, as shown on Sheet 2 of Figure 8.3-11. Insert F

Q430.65

Insert A

Table 9.5-17 identifies all necessary working stations where it may be necessary for plant personnel to communicate with the control room or the emergency shutdown panel during and/or following transients and/or accidents (including fires) in order to mitigate the consequences of the event and to attain a safe cold plant shutdown. The identified working stations or areas in this table are selected from the Fire Hazard Analysis presented in Appendix 9A wherein all areas containing safe shutdown equipment and cables are evaluated for effect of fire on the ability to achieve and maintain cold shutdown. The areas shown on Table 9.5-17 are those which contain equipment required for shutdown, areas containing only raceways and cables are not shown.

Insert B

The locations of public address loudspeakers and handset/speaker amplifier are selected to provide effective communications and to accommodate areas with high noise levels during normal plant operation and accident condition, including fire. The design of these public address components includes provisions for volume control of the loudspeakers, adjustment in loudspeaker mounting to provide maximum coverage, and special noise-cancelling handset which are effective in high ambient noise areas without use of acoustic booths. As indicated in Section 14.2.12.1.38, the public address system will be tested with area equipment running. Any relocation and adjustment of the public address components will be provided as necessary as result a of the testing. Estimates of maximum sound levels are provided as indicated on Table 9.5-17. These estimates are based on equipment being energized or running and based on no sound level attenuation which would result from accounting for room constant and distance and location of the noise source(s).

Insert C

Table 9.5-17 also shows for each of the safety-related rooms the types of communication system components available with the associated maximum sound levels within the room. All of the communication components have the capability to function in the sound environments that are listed in the Table 9.5-17. The table 9.5-17 defines the maximum sound level capability for each communication component.

Insert D

As part of Table 9.5-17, the maximum noise levels are estimated for the areas where personnel will be communicating with the control room or remote shutdown panel room. Generally, PA handsets and telephones are not located in areas with high noise levels. The maximum noise levels are estimated based on the type of operating equipment in the area with the sound defined by industry standards, such as NEMA Publication MG I and IEEE standards. If several types of equipment are in the same area, then the noise level associated with the noisiest equipment is shown on this table.

Q430.23

Insert E

The communication systems are preoperationally tested to demonstrate that the public address system is effective in areas with high noise levels and that other communication systems are effective between the control room or emergency shutdown panel and working stations as indicated in Table 9.5-17.

Insert F

This uninterruptible power supply (UPS) is fed from Class 1E, Channel A, distribution buses. The UHF radio system is also supplied with a non-class 1E uninterruptible power supply. The design of each UPS, as shown on Figure 8.3-11, is such that there are three input power feeders - two from 480V ac motor control centers and one from a 125V dc switchgear. In the case of the UHF radio system, the non-class 1E 480V ac motor control centers, which are connected to Class 1E 480V load centers, are tripped on a LOCA signal. The radio system will be powered from the non-class 1E batteries (4 hour rated) through the UPS under all accident cases. After a LOCA the operator can manually reconnect the non class 1E UPS to the Class 1E load center that is powered from the stand-by diesel generator. The UHF radio system will be powered at all times during any power distribution transfers. The non-class 1E UPS, batteries, and associated electrical distribution equipment that supply power to the radio system were purchased under the same technical specifications as the Class 1E equipment and are located in Seismic Category I structures.

Q430.65 TABLE

Notes for Table 9.5-17

1. These lighting levels are at the panel or equipment surface.

2. The following are the maximum sound levels (db) that the communication components are capable of producing or operating in.

Component	Sound Level
PA speaker (driven by 30w amplifier)	120
PA headset	110
UHF radio portable set	80
Telephone	70

3. In these rooms the UHF radio sets' sound capability is below the maximum sound level that could be experienced in the room. In these rooms the adjacent hallway can be utilized for communication with the UHF radio set.

4. The work stations identified on the table are areas that may be required to be manned during design bases accidents or during the improbable event of a loss of all ac power.

[illegible] EXISTING
TABLE 9.5-17 (AMEND. 4)
WITH THIS

HCGS FSAR

TABLE 9.5-17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA/EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION (See note 4)	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM 8-HOUR BATTERY PACK
(See note 2)	LEGEND: 1 = PA HANDSET; 2 = PA SPEAKER; 3 = TELEPHONE; 4 = RADIO	LEGEND: dBA = DECIBEL, A-WEIGHTED; < = LESS THAN			
AUXILIARY BUILDING					
ROOM 3576, EL. 137 REMOTE SHUTDOWN PANEL	1, 2, 3, 4	<60	Yes	30	10 (see note 1)
ROOM 5164 EL 54 HPCI BATTERIES	2, 4	<30	—	3	1
ROOM 5165, EL. 54 RPS MG SET	1, 2, 4	<80	—	3	1
ROOM 5166, EL. 54 CORRIDOR	2, 4	<50	—	5	3
ROOM 5167, EL. 54 DIESEL FUEL OIL STORAGE TANKS AND PUMPS	2, 4	<80	—	3	1
ROOM 5168, EL. 54 DIESEL FUEL OIL STORAGE TANKS AND PUMPS	2, 4	<50	—	3	1
Room 3504, EL. 137 CORRIDOR	2, 4	<50	—	3	3

TABLE 9.5-17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA/EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM 8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5109, EL. 54 DIESEL FUEL OIL STORAGE TANKS AND PUMPS	2, 4	<80	—	3	1
ROOM 5110, EL. 54 DIESEL FUEL OIL STORAGE TANKS AND PUMPS	2, 4	<80	—	3	1
ROOM 5111, EL. 54 CORRIDOR	4	<50	—	3	1
ROOM 5112, EL. 54 CORRIDOR	1 (IN ADJACENT VESTIBULE), 2, 4	<50	—	5	1
ROOM 5128, EL. 54 RCIC BATTERIES	2, 4	<50	—	3	1
ROOM 5129, EL. 54 HPCI BATTERY CHARGER AND DC SWITCHGEAR	4.	<70	—	10	1
Room 5101, El. 137 STAIRWAY	**2, 4**	**<50**		**3**	**3**

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: 8-HOUR BATTERY PACK
AUXILIARY BUILDING (CONTINUED)	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5130, EL. 54 RCIC BATTERY CHARGER AND DC SWITCHGEAR	2, 4	< 70	—	3	1
ROOM 5208, EL. 77 D/G ROOM HVAC COOLER AND RECIRCULATION FAN	2, 4 (SEE NOTE 3)	< 100	—	3	1
ROOM 5209, EL. 77 D/G ROOM HVAC COOLER AND RECIRCULATION FAN	2, 4 (SEE NOTE 3)	< 100	—	3	1
ROOM 5210, EL. 77 D/G ROOM HVAC COOLER AND RECIRCULATION FAN	2, 4 (SEE NOTE 3)	< 100	—	3	1
ROOM 52[illegible], EL. 77 D/G ROOM HVAC COOLER AND RECIRCULATION FAN	2, 4 (SEE NOTE 3)	< 100	—	3	1
ROOM 52[illegible], EL. 77 CORRIDOR	1 (IN ADJACENT VESTIBULE), 2, 4	< 50	—	5	1

TABLE 9.5-1[illegible]

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA/EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: 8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5301, EL. 102 CORRIDOR	2, 4	<50	—	5	1
ROOM 5302, EL. 102 CONTROL PANELS	2, 4	<65	—	3	1
ROOM 5304, EL. 102 D/G AND CONTROL PANELS	2, 4 (see note 3)	<110	—	3	2
ROOM 5305, EL. 102 D/G AND CONTROL PANELS	2, 4 (see note 3)	<110	—	3	2
ROOM 5306, EL. 102 D/G AND CONTROL PANELS	2, 4 (see note 3)	<110	—	3	2
ROOM 5307, EL. 102 D/G AND CONTROL PANELS	2, 4 (see note 3)	<110	—	3	2
ROOM 530[illegible], EL. 102 CORRIDOR	(IN ADJACENT VESTIBULE), 2, 4	<50	—	4	4

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: 8-HOUR BATTERY PACK
AUXILIARY BUILDING CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5401, EL. 124 CORRIDOR/ACCESS AREA	2, 4	<50	—	3	2
ROOM 5402, EL. 117-6 CONTROL PANELS	1, 2, 4	<65	—	3	2
ROOM 5404, EL. 124 CORRIDOR	1, 2, 4	<50	—	3	2
ROOM 5409, EL. 124 CORRIDOR	1, 2, 4	<50	—	3	2
ROOM 5410, EL. 124 D/G REMOTE CONTROL PANELS AND SEQUENCER	2, 4	<65	YES	≥10	≥10 (SEE NOTE 1)
ROOM 5411, EL. 124 SWITCHGEAR, LOAD CENTERS, MCCs AND DIST. PANELS	1, 2, 4	<70	YES	≥10	≥10 (SEE NOTE 1)
ROOM 5412, EL. 124 D/G REMOTE CONTROL PANELS AND SEQUENCER	1, 2, 4	<65	YES	≥10	≥10 (SEE NOTE 1)
ROOM 5413, EL. 124 SWITCHGEAR, LOAD CENTERS, MCCs AND [illegible] PANELS	1, 2, 4	<70	YES	≥10	≥10 (SEE NOTE 1)

TABLE 9.5-17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA/EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM ESSENTIAL AC: WORK STATION	ESSENTIAL AC	8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5414, EL. 124 D/G REMOTE CONTROL PANELS AND SEQUENCER	1, 2, 4	<65	YES	≯10	≯10 (see NOTE 1)
ROOM 5415, EL. 124 SWITCHGEAR, LOAD CENTERS, MCCs AND DIST. PANELS	1, 2, 4	<70	YES	≯10	≯10 (see NOTE 1)
ROOM 5416, EL. 124 D/G REMOTE CONTROL PANELS AND SEQUENCER	1, 2, 4	<65	YES	≯10	≯10 (see NOTE 1)
ROOM 5417, EL. 124 SWITCHGEAR, LOAD CENTERS, MCCs AND DIST. PANELS	1, 2, 4	<70	YES	≯10	≯10 (see Note 1)
ROOM 5427, EL. 124 [illegible] PANELS	2, 4	<65	—	3	1
ROOM 5418, EL. 124 INVERTERS AND DIST. PANELS	1 (IN ADJACENT VESTIBULE), 2, 4	<70	—	3	1
ROOM 5501, EL. 137 INVERTERS AND DIST. PANELS	2, 3 (IN ADJACENT ROOM), 4	<70	—	3	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - 8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5502, EL. 137 CORRIDOR	2, 3 (IN ADJACENT ROOM), 4	<50	—	8	2
ROOM 5510, EL. 137 CONTROL ROOM [illegible] AND CONSOLES	1, 2, 3, 4	<60	YES	30	15
ROOM 5537, EL. 137 CORRIDOR	1 (IN ADJACENT VESTIBULE), 2, 4	<50	—	3	2
ROOM 5538, EL. 137 BATTERY CHARGERS, FUSE BOX AND BATT. MONITOR	4	<65	—	3	2
ROOM 5539, EL. 137 BATTERIES	2, 4	<50	—	3	2
ROOM 5540, EL. 137 BATTERY CHARGERS, FUSE BOX AND BATT. MONITOR	4	<65	—	3	2
ROOM 5541, EL. 137 BATTERIES	4.	<50	—	3	2
ROOM 5542, EL. 137 BATTERY CHARGERS, FUSE BOX AND BATT. MONITOR	2, 4	<65	—	3	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - 8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5543, EL. 137 BATTERIES	2, 4	<50	—	3	2
ROOM 5544, EL. 137 BATTERY CHARGERS, FUSE BOX AND BATT. MONITOR	2, 4	<65	—	3	2
ROOM 5545, EL. 137 BATTERIES	4	<50	—	3	2
ROOM 5602, EL. 155-3 CONTROL AREA WATER CHILLER, CONTROL ROOM AIR HANDLING UNIT AND RETURN AIR FAN, AND HVAC CONTROL PANEL	1 (LOCATED AWAY FROM LARGEST NOISE SOURCE), 2, 4 (SEE NOTE 3)	<110	—	3	2
ROOM 5604, EL. 163-6 CORRIDOR	1, 2, 4	<50	—	3	2
ROOM 5605, EL. 163-6 CONTROL PANELS	4	<65	—	3	2
ROOM [illegible], EL. 163-6 CORRIDOR	2, 4	<50	—	3	1

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - 8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5606, EL. 163-6 SWITCHGEAR ROOM COOLERS AND D/G BATTERY ROOM EXHAUST FANS	2, 4	<90	—	5	2
ROOM 5607, EL. 163-6 INVERTER, DC SWITCHGEAR, BATTERY CHARGER AND FUSE BOX	4	<70	—	3	1
ROOM 5608, EL. 163-6 CORRIDOR	2 (IN ADJACENT CORRIDOR), 4	<50	—	5	2
ROOM 5609, EL. 163-6 BATTERIES	4	<50	—	4	2
ROOM 5610, EL. 163-6 CORRIDOR	4	<50	—	9	1
ROOM 5612, EL. 163-6 CORRIDOR	4	<50		8	1
ROOM 5629, EL. [illegible] 6 SWITCHGEAR ROOM COOLERS AND D/G BATTERY ROOM EXHAUST FANS	1, 2, 4 (SEE NOTE 3)	<90	—	5	2
ROOM 5630, EL. [illegible] CONTROL AREA WATER CHILLER, CONTROL ROOM AIR HANDLING UNIT AND RETURN AIR FAN, [illegible] CONTROL PANEL	2, 4 (SEE NOTE 3)	<110	—	3	2

TABLE 9.5-17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA/EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: 8-HOUR BATTERY PACK
AUXILIARY BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 5702, EL. 178 CORRIDOR	2 (IN ADJACENT ROOM), 4	<70	—	5	2
ROOM 5704, EL. 178 CONTROL AND DIESEL AREA HVAC EQUIPMENT	1 (LOCATED AWAY FROM NOISIEST EQUIPMENT), 2, 4 (SEE NOTE 3)	<105	—	3	2
REACTOR BUILDING					
ROOM 4104, EL. 54 CORE SPRAY PUMP AND UNIT COOLERS	1 (IN ADJACENT VESTIBULE), 2, 4 (SEE NOTE 3)	<106	—	15	2
ROOM 4102, EL. 54 TO 101 VALVES	2, 4	<70	—	3	1
ROOM 4105, EL. 54 CORE SPRAY PUMP AND UNIT COOLERS	1 (IN ADJACENT VESTIBULE), 2, 4 (SEE NOTE 3)	<106	—	15	2
ROOM 4107, EL. 54 RHR PUMP, JOCKEY PUMP, UNIT COOLER AND INSTRUMENT RACK	1 (IN ADJACENT ELECTRICAL ROOM), 2, 4 (SEE NOTE 3)	<108	—	3	1

TABLE 9.5-17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA/EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	EMERGENCY LIGHTING SYSTEM FEATURES: WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES – APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES – APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM: 8-HOUR BATTERY PACK
REACTOR BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 4108, EL. 54 RCIC-MCC AND INSTRUMENT RACKS	1, 2, 4	<65	—	10	2
ROOM 4109, EL. 54 RHR PUMP, HX AND UNIT COOLER	1 (IN ADJACENT ELECTRICAL ROOM), 2, 4 (SEE NOTE 1)	<108	—	3	2
ROOM 4110, EL. 54 RCIC PUMP, TURBINE, GLAND STEAM CONDENSER, VACUUM PUMP, CONDENSATE PUMP, JOCKEY PUMP AND UNIT COOLERS	2, 4 (SEE NOTE 1)	<110	—	3	2
ROOM 4111, EL. 54 HPCI PUMP, TURBINE, GLAND STEAM CONDENSER, VACUUM PUMP, JOCKEY PUMP, VALVES AND UNIT COOLERS	2, 4 (SEE NOTE 1)	<110	—	3	1
ROOM 4112, EL. 54 HPCI-MCC AND INSTRUMENT RACKS	1, 2, 4	<65	—	3	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

	COMMUNICATION FEATURES		EMERGENCY LIGHTING SYSTEM FEATURES	
			APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM-	
AREA / EQUIPMENT	COMPONENTS AVAILABLE AT AREA	ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	ESSENTIAL AC	8-HOUR BATTERY PACK
REACTOR BUILDING - (CONTINUED)	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN	WORK STATION	
ROOM 4113, EL. 54 RHR PUMP, HX AND UNIT COOLER	1 (IN ADJACENT ELECTRICAL ROOM), 2, 4 (SEE NOTE 3)	<108	— 3	2
ROOM 4114, EL. 54 RHR PUMP, JOCKEY PUMP, INSTRUMENT RACK, UNIT COOLERS	1 (IN ADJACENT ELECTRICAL ROOM), 2, 4 (SEE NOTE 3)	<108	— 5	2
ROOM 4116, EL. 54 CORE SPRAY PUMP AND UNIT COOLERS	1 (IN ADJACENT VESTIBULE), 2, 4 (SEE NOTE 3)	<106	— 25	2
ROOM 4118, EL. 54 CORE SPRAY PUMP AND UNIT COOLERS	1 (IN ADJACENT VESTIBULE), 2, 4 (SEE NOTE 3)	<106	— 5	2
ROOM 4201, EL. 77 MCCs	1 (IN ADJACENT ROOM), 2, 4	<65	— 3	2
ROOM 4202, EL. 77 INSTRUMENT RACKS	1, 2, 4 (SEE NOTE 3)	<100	— 3	2
ROOM 4203, EL. 77 INSTRUMENT RACK	2, 4	<65	— 3	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM — WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM — ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM — 8-HOUR BATTERY PACK
REACTOR BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 4208, EL. 77 RHR HX AND UNIT COOLER	2, 4	<85	—	3	2
ROOM 4209, EL. 77 VALVES AND INSTRUMENTS	1 (IN ADJACENT VESTIBULE), 2, 4 (see note)	<100	—	3	1
ROOM 4210, EL. 77 INSTRUMENTS	2, 4	<65	—	3	2
ROOM 4214, EL. 77 RHR HX	2, 4	<85	—	3	2
ROOM 4215, EL. 77 INSTRUMENT RACK	2, 4	<65	—	3	2
ROOM 4216, EL. 77 CORRIDOR	2, 4	<50	·	3	1
ROOM 4218, EL. 77 INSTRUMENT RACK	1, 2, 4	<65	—	3	2
ROOM 4219, EL. 77 INSTRUMENTS	2; 4	<65	—	3	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - 8-HOUR BATTERY PACK
REACTOR BUILDING - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 4301, EL. 102 CORRIDOR	1, 2, 4	<65	—	3	2
ROOM 4303, EL. 102 MCC	1, 2, 4	<65	—	3	2
ROOM 4307, EL. 102 SACS PUMPS AND HXs, CONTROL PANELS, VALVES AND UNIT COOLERS	2, 4 (SEE NOTE 3)	<106	—	3	2
ROOM 4309, EL. 102 SACS PUMPS AND HXs, CONTROL PANELS, VALVES AND UNIT COOLERS	1 (LOCATED AWAY FROM NOISIEST EQUIPMENT), 2, 4 (SEE NOTE 3)	<106	—	3	1
ROOM 4315, EL. 102 CORRIDOR	2 (NEARBY), 4	<65	—	3	2
ROOM 4327, EL. 102 HPCI VALVES	2, 4	<80	—	3	2
ROOM 4329, EL. 102 RHR VALVES	2, 4	<80	—	3	2
ROOM 4319, EL. 102 RCIC VALVE	2, 4	<80	—	3	2
ROOM [illegible], EL. 102 RHR VALVE	2, 4	<80	—	3	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	WORK STATION	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM - 8-HOUR BATTERY PACK
INTAKE STRUCTURE	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN			
ROOM 107, EL. 79-8 VALVES	2, 4	< 80	—	3	2
ROOM 110, EL. 79-8 VALVES	2, 4	< 80	—	3	2
ROOM 203, EL. 93 MCCs	1 (IN ADJACENT ROOM), 2, 4	< 65	—	10	2
ROOM 204, EL. 93 PUMPS, VALVES AND CONTROL PANELS	1 (IN ADJACENT ROOM), 2, 4 (SEE NOTE 1)	< 108	—	5	2
ROOM 207, EL. 93 MCCs	1, 2 (IN ADJACENT ROOM), 3, 4	< 65	—	10	2
ROOM 208, EL. 93 PUMPS, VALVES AND CONTROL PANELS	1, 2 (IN ADJACENT ROOM), 4 (SEE NOTE 1)	< 108	—	5	2
EL. 107 TRAVELING SCREEN CONTROL PANELS	2, 4	< 80	—	10	1
EL. 114 TRAVELING SCREEN MOTOR ROOM FANS	2, 4	< 70	—	10	2

TABLE 9.5 - 17

COMMUNICATIONS AND EMERGENCY LIGHTING SYSTEMS FOR SAFE SHUTDOWN AREAS

AREA / EQUIPMENT	COMMUNICATION FEATURES: COMPONENTS AVAILABLE AT AREA	COMMUNICATION FEATURES: ESTIMATED MAXIMUM NOISE LEVEL AT AREA, dBA	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM ESSENTIAL AC	EMERGENCY LIGHTING SYSTEM FEATURES: APPROXIMATE FOOTCANDLES AT EQUIPMENT FROM 8-HOUR BATTERY PACK
INTAKE STRUCTURE - CONTINUED	LEGEND 1 = PA HANDSET 2 = PA SPEAKER 3 = TELEPHONE 4 = RADIO	LEGEND dBA = DECIBEL, A-WEIGHTED < = LESS THAN	WORK STATION	
ROOM 305, 306, EL. 122 FANS	1, 2, 4 (see note 7)	<90	— 10	1
ROOM 311, 312, EL. 122 FANS	1, 2, 4 (see note 7)	<90	— 10	1
STAIRWELLS	2		—	

QUESTION 430.66 (SECTION 9.5.2)

Discuss the protective measures taken to assure a functionally operable onsite and offsite communiation system. The discussion should include the considerations given to component failures, loss of power and the severing of communication lines or trunks as a result of an accident or fire. (SRP 9.5.2, Part II)

RESPONSE

Protective measures provided to assure a funcitonally operable onsite and offsite communication system include:

a. Powering each communication system from a separate and independent power source so that a loss of one power source only affects one communication system. (Additional discussion on the power sources is provided in response to Question 430.~~69~~ 65)

b. Locating central components of the communication system in different areas of the plant so that a fire cannot damage more than one system.

c. Providing separate and dedicated raceways for each of the communication system's wiring so that each communication system circuit is physically separated from the other.

d. Immediate detection of component failures for the onsite communication systems of page party public address, telephone and two-way radio systems because of their regular use in the day-to-day plant operation. ~~The offsite communication system will be periodically tested to ensure operability.~~ This item is further addressed in response to Question 430.75.

~~Although the onsite and offsite communication systems are independent of each other, there are cases where individual components of each system are located in the same area, e.g., control room, because of operational consideration. In the event of severing of communication lines as a result of an accident or fire, the two-way radio system serves as the backup communication system to the hard-wired communication systems.~~ Insert A

~~Section 15.0, Exercises and Drills, of the HCGS Emergency Plan, specifies frequency of emergency planning drills. Use of the offsite communication system(s) during these drills constitutes testing of the same.~~

insert Attachment A.

e. Additionally where non-1E MCC's are used as the power source for the onsite communication system, this equipment was purchased under the same specification, purchase order as used for the Class IE equipment. Therefore, the non-IE equipment is the same model number, design and construction as its IE counterpart.

Although the onsite and offsite communication systems are independent of each other, there are cases where individual components of each system are located in the same room, e.g., control room, because of operational consideration. In the event of loss of communication lines as a result of an accident or fire, the two-way radio system serves as the backup communication system to the hard-wired communication systems for that room.

A fire in a single room can not cause a total loss of the public address system and the telephone system because their major components including power supplies are not located in the same room. The separation of the conduits used for routing of each communication system mitigate the potential for loss of all communication system due to a single failure in the conduit system.

A partial loss of the hard-wired communication systems may result from a fire in a single room if there are conduits of both systems located therein but because the communication circuits are designed and routed in branches, a common loss of one branch of both systems only affects that fire area.

The onsite-handheld radios (transceivers) have provision for transmitting and receiving independent of the base station such that communications can be maintained in the event that the base station or remote control consoles are lost due to a fire or to loss of power.

As indicated previously, the Hope Creek onsite radio system provides an overall backup to the other onsite hardwired communication systems.

QUESTION 430.67 (SECTION 9.5.2)

The description of the intraplant and interplant (plant to offsite) communication systems is inadequate. Provide a detailed description for each communication system listed in Section 9.5.2.2 of the FSAR. The detailed description shall include an identification and description of each system's power source, a description of each system's components (headsets, handsets, switchboards, amplifiers, consoles, handheld radios, etc.), location of major components (power sources, consoles, etc.) and interfaces between the various systems. (SRP 9.5.2, Parts II & III)

RESPONSE

Section 9.5.2.2 has been revised to include additional description for each communication system, including offsite communications systems and power supplies.

See ATTACHED

1/5

430.67

Response

As identified in Section 9.5.2.2 the Hope Creek two-way radio communication system has an interface capability for connection with the Salem system. The system interconnection is designed as follows:

There are three designated channels, one channel for each nuclear unit, with each having a different UHF carrier frequency.

Salem 1	-	Channel 1
Salem 2	-	Channel 2
Hope Creek	-	Channel 3

A dedicated radio remote control console is provided in each of the Hope Creek and Salem units' control rooms. The radio system is used for two-way communications by station operating and maintenance personnel and is controlled by the consoles in each unit. The system is designed so that the radio systems provide segregated communications for each nuclear unit.

The only instance where interplant or inter-unit radio systems are intertied is when a conversation or instruction is necessary to be transmitted to the fire fighting emergency personnel.

"Merge-Isolate" capability for the plant and refueling platform PA systems is provided at the communication cabinet located in the main control room.

The telephone system of Section 9.5.2.2.2 can be patched into the PA system page channel to enable communications to be conducted between telephone and PA handset locations.

The radiation alert signal and the fire alarm signal are transmitted over the paging channel of the PA system, overriding its normal use. The PA system is fed from an uninterruptible power source, as shown on Figure 8.3-11.

9.5.2.2.2 Telephone System

INSERT "A"

The automatic telephone system is furnished and maintained by the New Jersey Bell Telephone Company. The system has a capacity of approximately 300 lines. The power supply for this system consists of an independent charger and battery with a capability of operating the entire plant telephone system for a minimum of 8 hours after a loss of the normal ac supply. Direct lines, including the emergency notification system (ENS) to the Nuclear Regulatory Commission offices, are powered from a station inverter to ensure continued direct communications during loss of offsite power (LOP). Drawing Number E-1467-0 (drawing referenced in Section 1.7) illustrates the location of the components in a riser diagrammatic form.

9.5.2.2.3 4 Two-Way Radio Communications System

Two radio communication systems are provided. One System is for security personnel use and it is described in Section 13.6. The other system is for station personnel use as described herein. This radio communication system serves as an alternate communication system to the public address and the telephone systems. This system consists of three remote control consoles, a primary and a backup base repeater stations with manual switchover provision, handheld transceivers (radios) and antenna divider network with antennas and transmission lines distributed throughout the power block.

The radio system is used by the fire brigade, described in Section 9.5.1.5.2, and by other station personnel. However, during the preoperational testing phase of the plant, the radio system is used by startup personnel. The radio system also has interface capability for connection with the Salem radio system.

2/5

Q 430.67

Insert A

9.5.2.2.2 Telephone System

The telephone system at Hope Creek Generating Station is a Private Automatic Branch Exchange (PABX) supplied and installed by the telephone company. The system is equipped with the latest software package and dual processing for back-up reliability.

The Hope Creek Generating Station telephone communication system is designed to provide reliable intraplant and interplant (plant-to-offsite) communications under both normal plant operation and accident conditions.

The telephone equipment allows communication throughout the plant by dialing the appropriate four digit extension number. Communications on site, off site or with the Emergency Operations Facility (EOF) is accomplished by dialing the appropriate tie line code(s). The communications network connects both public and private facilities to the site. It is tied directly to the site switching network with multiple Telephone Company systems, central office tie lines, private PSE&G tie lines and microwave channels.

The telephone system provides sufficient equipment of various types and in various locations so that the plant has adequate telephone communications to start up, continue safe operation, and safely shut down.

Hope Creek primary communication paths entering the PSE&G Network, including the EOF (Emergency Operations Facility), will be through PSE&G's private Microwave System. The lines to the corporate headquarters in Newark and the Salem EOF will be routed "first-choice" through the PSE&G Microwave System. PSE&G's microwave is equipped with its own battery chargers and emergency 8-hour batteries, and backed up with UPS (Uninterruptable Power Supply) and diesel generator.

Communication channels may also enter or exit Hope Creek Generating Station via two additional paths, provided by the telephone company. These paths will enter the Salem C.O. (Central Office telephone company) through either a hardwire link or the telephone company's microwave system. The Salem Generating Station switch (PABX) is equipped with a UPS system and diesel generator. The Hope Creek switch (PABX) will also be equipped with a UPS system and diesel generator.

Upon failure of telephone equipment or in emergency situations, necessary telephone communications for pertinent personnel will be maintained. These communication channels will be available in the form of Newark Centrex extensions via Microwave which will be placed at strategic locations.

9.5.2.2.3 MICROWAVE SYSTEM

The Public Service Electric & Gas Co. microwave system provides Hope Creek Generating Station with a reliable telecommunications medium. The microwave system links Hope Creek Generating Station into the various facilities within the Public Service Electric & Gas Co. service area including the Load Dispatcher Command Center in the Newark, N.J. Corporate Headquarters. The microwave links are a combination of general use communication channels and dedicated voice channels for operational communications and emergency communications.

The microwave system uses frequency-modulated low-power radio signals that operate in the 6,000 MHZ band, which is the industrial microwave frequency bands established for industrial users by the Federal Communications Commission. The system is equipped with its own battery chargers and emergency 8-hour batteries, and backed up with UPS (Uninterruptable Power Supply) and diesel generator.

The microwave electronic equipment has built in redundant equiupment in the hot standby mode in case of failure, and two transcievers in parallel for redundant transmitting and receiving capabilities. The microwave tower also contains a dish antenna in addition to the Public Service Electric & Gas Co. antenna for the Telephone Company microwave system which is used for additional site communications and redundancy. The load dispatchers office contains alarms which give indication of microwave trouble. This is also alarmed locally.

The microwave equipment is contained in a separate building separated from the telephone equipment building, these structures are located on the Salem Generating Station site. These equipment buildings and the mircowave tower are located a considerable distance from the Salem Generating Station power block, Hope Creek Generating Station power block and the Hope Creek Generating Station telephone equipment building.

One of the remote control consoles is located in the main control room for operators use and another is located in the fire brigade room. The third remote control console is available as a spare unit. The repeater stations are located within the auxiliary building. Antenna networks are located throughout the power block in order to achieve maximum coverage.

The power source is an uninterruptible source. This supply is the security system ac power supply OAD495 as shown on sheet 2 of Figure 8.3-11.

9.5.2.2.5 Remote Shutdown Panel

The remote shutdown panel room has both a telephone and a PA handset station for communication link with other plant locations.

9.5.2.3 System Evaluation

System design considerations include diversity and operational reliability. The inplant communication systems are provided with reliable, uninterruptible power supply for uninterrupted communications between all areas of the plant.

The PA system is the primary means of intraplant communication for plant operations. The telephone system is used as a backup in the event of a failure of the public address system. The telephone system is also used for special communication requirements and normal offsite communications. A two-way radio communication system provides backup to intraplant communication in the event of total loss of both systems.

The communication systems have adequate flexibility to keep the plant personnel informed of plant operational status at all times.

The integrated design of the system provides effective communication between plant personnel in all vital areas during

QUESTION 430.68 (SECTION 9.5.2)

In Section 9.5.2.4 of the FSAR you state that inservice inspection tests, preventative maintenance, and operability checks are performed periodically to prove the availability of the communication systems. Provide the frequency of these tests. (SRP 9.5.2, Part II and III).

RESPONSE

The conventional special page and phone systems are in frequent use and will require no periodic maintenance or surveillance testing. The HCGS Maintenance Department will replace and/or repair components that fail during normal use.

Periodic tests and operability checks of infrequently used communications system will be performed in accordance with the frequencies specified in Section ~~13.3~~. 15.0, Exercise and Drills, of the HCGS Emergency Plan.

See attached

RESPONSE Q. 430.68

All of the stations comprising onsite communication systems used at Hope Creek are in frequent use during normal plant operations. no special perodic maintenance or surveillance testing is required for this communications system.

QUESTION 430.69 (SECTION 9.5.2)

Section 9.5.2 of the FSAR describes the intraplant communication system at Hope Creek which is composed of three subsystems. They are Public Address (PA), Telephone, and Two-Way Radio Systems. A number of areas in the plant are served by one or more of these systems. All these systems are classified non-Class 1E. The PA system is powered from Division A of the Vital Class 1E station batteries; the power sources for the other systems are undefined. Assuming a failure, non-availability due to loss of power, or in ability to use a system due to its interference with control instrumentation or equipment such as the radio system of any or all of these systems following a seismic event, it is possible that portions of the plant may be without adequate communications for an extended period of time during the design basis event. This is unacceptable, it is our position that adequate communications be provide to all vital, hazardous and safety related areas needed for the safe shutdown of the reactor and the evacuation of personnel in the event of a design basis event. Modify your design to provide the necessary communication for postulated conditions above or justify the present design. (SRP 9.5.2, Parts I & II)

RESPONSE

Section 9.5.2.3 has been revised to provide evaluation of seismic event on the communication systems. The power sources for the other systems are discussed in the response to Question 430.~~67~~ 65. and revised Section 9.5.2.

"Merge-Isolate" capability for the plant and refueling platform PA systems is provided at the communication cabinet located in the main control room.

The telephone system of Section 9.5.2.2.2 can be patched into the PA system page channel to enable communications to be conducted between telephone and PA handset locations.

The radiation alert signal and the fire alarm signal are transmitted over the paging channel of the PA system, overriding its normal use. The PA system is fed from an uninterruptible power source, ~~as~~ shown on Figure 8.3-11, sheet 2, as power supply 1CD496.

new ¶

9.5.2.2.2 Telephone System

The automatic telephone system is furnished and maintained by the New Jersey Bell Telephone Company. The system has a capacity of approximately 300 lines. The power supply for this system consists of an independent charger and battery with a capability of operating the entire plant telephone system for a minimum of 8 hours after a loss of the normal ac supply. Direct lines, including the emergency notification system (ENS) to the Nuclear Regulatory Commission offices, are powered from a station inverter to ensure continued direct communications during loss of offsite power (LOP). Drawing Number E-1467-0 (drawing referenced in Section 1.7) illustrates the location of the components in a riser diagrammatic form.

9.5.2.2.3 Two-Way Radio Communications System

Two radio communication systems are provided. One System is for security personnel use and it is described in Section 13.6. The other system is for station personnel use as described herein. This radio communication system serves as an alternate communication system to the public address and the telephone systems. This system consists of three remote control consoles, a primary and a backup base repeater stations with manual switchover provision, handheld transceivers (radios) and antenna divider network with antennas and transmission lines distributed throughout the power block. Drawing Number E-1475-1 (drawing referenced in Section 1.7) illustrates the location of the fixed components in a riser diagrammatic form.

The radio system is used by the fire brigade, described in Section 9.5.1.5.2, and by other station personnel. However, during the preoperational testing phase of the plant, the radio system is used by startup personnel. The radio system also has interface capability for connection with the Salem radio system.

One of the remote control consoles is located in the main control room for operators use and another is located in the fire brigade room. The third remote control console is available as a spare unit. The repeater stations are located within the Auxiliary Building. Antenna networks are located throughout the power block in order to achieve maximum coverage.

The instrumentation power source is an uninterruptible source. This supply is the ~~security system~~ ac power supply ~~0AD495~~ 1BJ484 as shown on sheet ~~4~~ 5 of Figure 8.3-11.

9.5.2.2.4 Remote Shutdown Panel

The remote shutdown panel room has both a telephone and a PA handset station for communication link with other plant locations.

9.5.2.3 System Evaluation

System design considerations include diversity and operational reliability. The inplant communication systems are provided with reliable, uninterruptible power supply for uninterrupted communications between all areas of the plant.

The PA system is the primary means of intraplant communication for plant operations. The telephone system is used as a backup in the event of a failure of the public address system. The telephone system is also used for special communication requirements and normal offsite communications. A two-way radio communication system provides backup to intraplant communication in the event of total loss of both systems.

The communication systems have adequate flexibility to keep the plant personnel informed of plant operational status at all times.

The integrated design of the system provides effective communication between plant personnel in all vital areas during startup, normal plant operation, and during the full spectrum of accident or incident conditions (including fire), under maximum potential noise levels. Effective plant-to-offsite communication has also been provided.

The communication systems have been evaluated to ensure that adequate communications are maintained following a seismic event such that safe shutdown capability is not affected. This assurance is provided by the design and locations of major components of the three intraplant communication systems as discussed below:

a. Power Sources

Although the communication systems are classified non-Class 1E, Class 1E sources are provided for the PA and ~~radio systems,~~ and a non-Class 1E source for the telephone systems. The Class 1E sources are designed to withstand seismic events and are located within a Seismic Category I structure to prevent a loss of power occurrence. The Class 1E sources are physically separated and independent of each other so that a single failure can only affect one communication system. The non-Class 1E communication loads are isolated from the Class 1E power supplies by use of solid state inverters and shunt trip of the backup source circuit breakers upon LOCA signal to prevent degradation of the Class 1E power sources. A loss of the non-Class 1E power source to the telephone system affects only that system.

b. Equipment Locations

The locations of the communications equipment are widely dispersed throughout the power block. The majority of the telephone components are located in non-safety related areas, including the central equipment. In safety related areas, the telephone components are comprised only of telephones and their dedicated conduits and are located away from safety related equipment. The major components of the PA and radio systems are located within a Seismic Category I structure; however, they are physically separated from each other and from safety related equipment. Therefore, it is unlikely that there will be a total

Insert A to Page 9.5-67

The power sources referred to in this subsubsection are those which supply input power to the static inverters from which the PA and radio systems receive ac power. Figure 8.3-11 depicts the design of each uninterruptible power supply (UPS). The static inverter is one component of each UPS, others are voltage regulator, rectifiers, and transfer switch; all components collectively ~~from~~ form an UPS system. The UPS system for the PA system has Class IE, Channel A, ac and dc input power sources; the UPS components are seismically qualified, and its distribution panel's construction, configuration and components are similar or nearly identical to those of the class IE distribution panels shown on Figure 8.3-11. The UPS system for the radio system has input ac power supplied from Class IE, Channel B, power sources through non-Class IE motor control centers (MCCs), and its dc input power is from a non-Class IE power source. However, both the non-Class IE MCC's and the non-Class IE DC equipment were purchased under the same specification and are the same model number, design and construction as their Class IE counterpart. Similarly, the radio system UPS components, distribution panel and input power MCCs are considered seismically qualified because the components are of Class IE design and construction. Therefore, power to the PA and radio systems will not be interrupted following a seismic event.

Insert B to Page 9.5-67

The communications equipment are not classified as Class IE; however, because of their inherent design and construction features, such as solid state components, and the manner in which communication equipment is mounted on walls and floors, the communications equipment are expected to remain functional following a seismic event.

6/7

loss of all communications equipment following a seismic event.

c. Raceways

Insert A

- Each of the communication system wiring is enclosed in its own dedicated conduits and/or with metallic sheathing and is physically separated from each other and from safety related raceways. Because of the dispersed locations of the communications components, it is unlikely that there will be a total loss of all communications due to failure of the wiring following a seismic event.

d. Communications Following a Seismic Event

Safe shutdown of the plant from the control room or the Remote Shutdown Panel room can be achieved without the need for intraplant communication systems because all necessary shutdown controls and indications are located therein. The operator also can initiate evacuation instructions/alarm from the control room, if necessary, by use of any one of the three communication systems since the total loss of all three systems is considered unlikely. (it is also unlikely that the radio system will cause interferences with control instrumentation and equipment because this type of system has been widely used in previously approved plants and preoperational testing of all safety related systems together with the radio system will demonstrate that interferences are not caused.)

Insert B

9.5.2.4 Inspection and Testing Requirements

The systems described above are conventional and have a history of successful operation at similar, existing plants. Most of these systems will be in routine use and maintenance, ensuring their availability. Infrequently used systems will be tested on a scheduled basis to ensure operability.

The radiation alert and fire alarm systems are periodically tested. These tests include adequacy of signal level, availability of power sources, and proper function of all circuits. See Section 14.2 for preoperational testing. ~~and Section 16.0 for periodic testing.~~

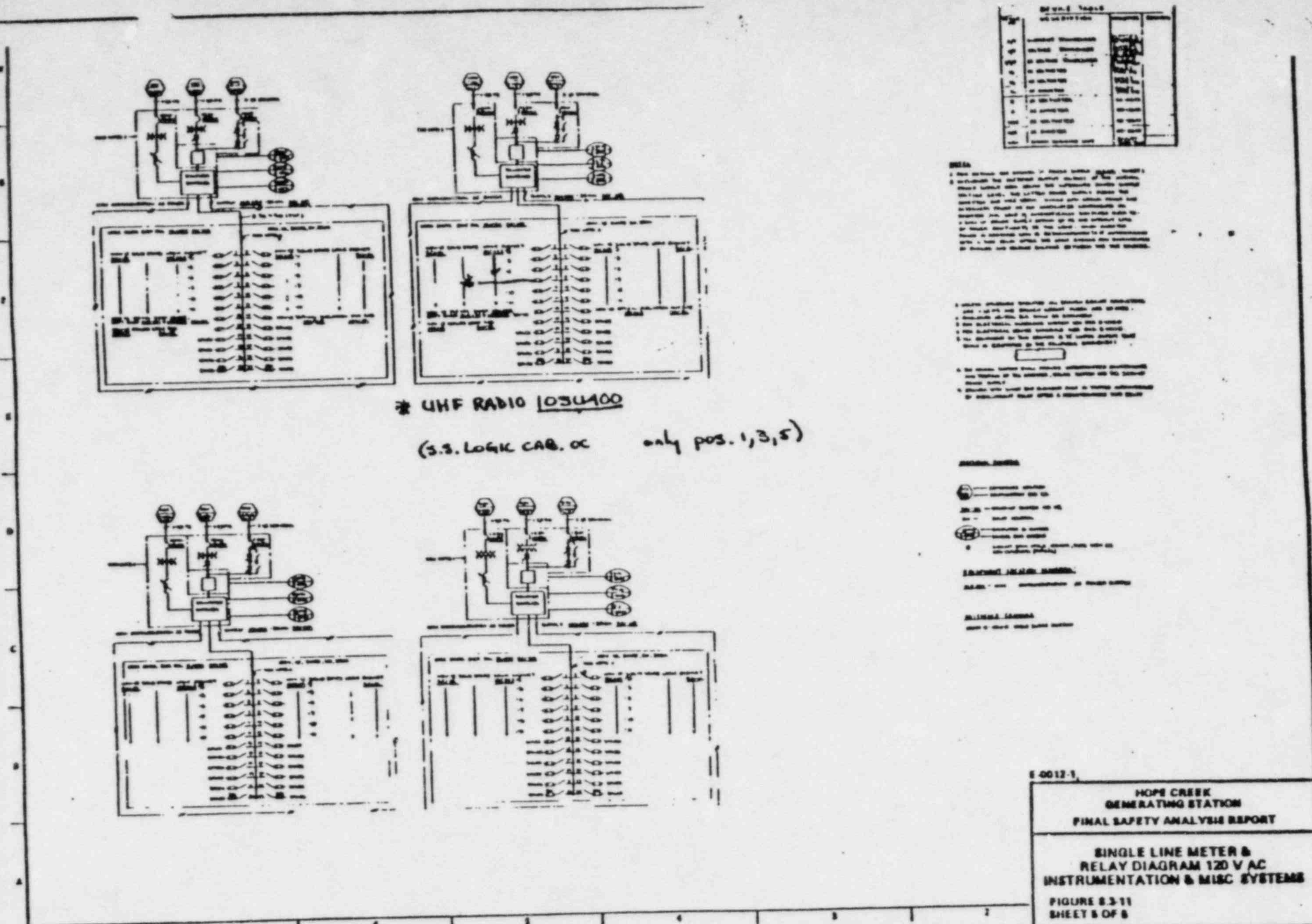
(BECHTEL NOTE: STANDARD TECHNICAL SPECIFICATION DOES NOT HAVE REQUIREMENT FOR TESTING OF EVACUATION ALARM TESTING.)

Insert A to Page 9.5-68

and of the communication circuits' design and routing as branches which are independent of each other.

Insert B to Page 9.5-68

In the event that communications need to be established between the control room or Remote Shutdown Panel room and other plant areas to achieve safe shutdown, an evaluation of communication systems available at each area revealed that at least one communication system component is located within or nearby each area. Table 9.5-17 lists the areas evaluated; the selected areas are based on the Fire Hazards Analysis presented in Appendix 9A which identifies areas containing safe shutdown equipment. Thus, assuming that there is a total loss of power to the communications system central equipment plus loss of the central equipment, communications can be maintained by use of hand-held radios (transceivers).



E-0012-1

HOPE CREEK
GENERATING STATION
FINAL SAFETY ANALYSIS REPORT

SINGLE LINE METER &
RELAY DIAGRAM 120 V AC
INSTRUMENTATION & MISC SYSTEMS

FIGURE 8.3-11
SHEET 5 OF 6

ATTCHD
430.69

QUESTION 430.70 (SECTION 9.5.3)

Identify the vital hazardous, and safety related areas where emergency lighting is needed for safe shutdown of the reactor and the evacuation of personnel in the event of an accident. Tabulate the lighting system provided in your design to accommodate those areas so identified. Include the degree of compliance to Standard Review Plan 9.5.1 regarding emergency lighting requirements in the event of a fire. (SRP 9.5.3, Parts I & II)

RESPONSE

Table 9.5-17 has been ~~added~~ revised to provide the requested information.

~~The areas identified in this table are those areas where operators and other station personnel are needed to perform, safe shutdown duties in the event of an accident. Access routes to the same areas are also included. The emergency lighting system for these routes are designed to comply with SRP Section 9.5.1 requirement for fixed self-contained lighting units.~~

~~The areas identified in this table have been selected as explained in the response to Question 430.65, and in addition the access and egress routes or corridors are listed. All of the areas listed on this table and all other plant areas are served by the normal lighting system described in Section 9.5.3.2. In the event of loss of offsite power, the emergency lighting system will provide lighting as shown on this table. The emergency lighting system is designed to comply with Branch Technical Position CMEB 9.5-1 as discussed in Section 9.5.1.6.11.~~

See Attached

430.70

The areas identified in this table have been selected as explained in the response to Question 230.65, and in addition the access and egress routes or corridors are listed. All of the areas listed on this table and all other plant areas are served by the normal lighting system described in Section 9.5.3.2. In the event of loss of offsite power, the emergency lighting system will provide lighting as shown on this table. The emergency lighting system is designed to comply with Branch Technical Position CMEB 9.5-1 as discussed in Section 9.5.1.6.11.

It should be noted that the column indicating 8 hour battery pack lighting levels does not include the standby lighting system powered by the non-IE battery system that is described in Section 9.5.3.2.2.b.

QUESTION 430.71 (SECTION 9.5.3)

Expand the lighting section of the FSAR to include a discussion of how lighting will be provided for those areas listed in requests 430.65 and 430.70 above and illuminated by the dc emergency lighting system only, in the event of a prolonged loss of offsite ac power or provide the rationale why lighting is not required in these areas. Include in your discussion what, if any, other areas would require lighting during a sustained loss of ac power, and how it would be provided. (SRP 9.3.3, Parts I & II)

RESPONSE

Sections 9.5.3.2.2 and 9.5.3.3 have ~~has~~ been revised to describe lighting for areas described in Questions 430.65 and 430.70.

THE RESPONSE TO QUESTIONS 430.65 & 430.70 HAVE BEEN REVISED TO PROVIDE ADDITIONAL INFORMATION/ ~~CLARIFICATION~~ REQUESTED BY QUESTION 430.71 Clarafication

1/19

safety-related equipment, and access routes to and between and egress routes from these areas.

may illuminance level

Table 9.5-17 lists the emergency lighting subsystems provided for areas where operators and other station personnel are needed to perform safe shutdown duties in the event of an accident. In the event of a prolonged loss of offsite power, each area will be illuminated by the self-contained, 8-hour battery pack units until the essential ac subsystem is manually reconnected to the standby diesel generator. For all other areas not listed on this table, at least one of the emergency lighting subsystems is provided in each area required for personnel safety and for access/egress purpose during an evacuation or fire. ← Insert A

9.5.3.3 Safety Evaluation

The lighting systems are not safety-related and are classified as non-Class 1E. However, components of lighting systems located above or adjacent to safety-related equipment are supported by Seismic Category II/I supports to protect safety-related equipment from damage during a seismic event. ← Insert B

The normal lighting system is designed such that offsite power supplies station lighting for normal plant operation, control and maintenance of equipment, and plant access routes.

> Insert C

The integrated design of the emergency lighting systems uses onsite power and/or self-contained battery packs to provide adequate emergency station lighting in all areas required for control and maintenance of safety-related equipment, firefighting, and the access routes to and between and egress routes from these areas.

Figure 9.5-20 is the single line drawing for the lighting distribution system.

Illumination levels provided in various areas either conform to or exceed those required in the IES handbook. ← Insert D

9.5.4 STANDBY DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER

2/19

Insert A to Page 9.5-72

The manual reconnection of the essential ac lighting loads to the diesel generator sources are performed under administrative control in accordance with station operating procedures. Hand-held portable lighting units will also be available to station personnel to provide supplemental lighting when necessary during a prolonged loss of offsite power condition.

Insert B to Page 9.5-72

In addition the control room lighting system is seismically qualified as part of the ceiling design.

Insert C to Page 9.5-72

The essential ac lighting system is designed to provide lighting from standby diesel generator sources through Class 1E unit substations and non-Class 1E MCCs. Although the non-Class 1E MCC are shed upon the occurrence of a LOCA, station operating procedures will require reconnection of the MCCs within 8 hours after the sh[illegible]ing. The non-Class 1E MCCs are designed and constructed the same as for Class 1E MCCs.

Insert D to Page 9.5-72

Station personnel will have access to hand-held portable lighting units when necessary for supplemental lighting.

3/19

QUESTION 430.72 (SECTION 9.5.3)

Provide a discussion on the protective measures taken to assure a functionally operable lighting system, including considerations given to component failures, loss of ac power, and the severing of lighting cables as a result of a accident or fire. (SRP 9.5.3, Parts I & II)

RESPONSE

The protective measures taken to ensure a functionally operable lighting system include: Insert 1

a. Diversity in power sources ~~such that a loss of one source does not disable more than one lighting subsystem.~~

b. Provision for emergency lighting as backup to the normal ac lighting system such that sufficient illumination is maintained during a loss of the normal lighting system due to component failure or loss of ac power.

c. Use of dedicated raceways and/or embedded conduits for branch circuits such that a severing of lighting cables as a result of a accident or fire affects only a portion of the lighting system. In the event the power supply cables in a particular area are severed instead of branch circuit cables, only a portion of the lighting system is affected because of the diversity provided in power sources, lighting subsystems and lighting components. Insert C from below

d. ~~Periodic~~ testing and maintenance of the emergency lighting system to ensure functional operability ~~The frequency of testing will be specified in the station preventive maintenance procedure which will be developed prior to fuel load.~~ IS ADDRESSED IN RESPONSE TO QUESTION 430.75

Insert to C.
Should branch circuits be severed as a result of a fire, the 8-hour battery pack units will function to provide lighting

Either the class 1E DC or non-1E DC systems or the non-1E ac

Insert 1 430.72

a. Diversity in power sources is provided by supplying the different lighting system from ~~both Class 1E, non-1E Ac and DC power~~ system. Essential lighting supplied from the Class 1E system are also distributed between the Class 1E channels so that no single failure will result in the reduction below an adequate level of lighting in any area.

QUESTION 430.73 (SECTION 9.5.3)

You state in Sections 9.5.3.1 and 9.5.3.3 of the FSAR that illumination levels provided in the various areas of the plant either conform to or exceed the required in the Illumination Engineering Society Handbook. This statement is too general particularly for emergency lighting. The staff has determined that a minimum of 10 foot candles at the work station is required to adequately control, monitor and/or maintain safety related equipment during accident and transient conditions and a minimum of 5 foot candles in the corridors which provide access to and egress from these areas. For those safety related areas listed in requests 430.65 and 430.70 above and illuminated by the dc lighting systems only verify that the minimum of 10 foot candles at the work station is being met. Also verify that the 10 foot candles minimum at the work station is being met by those safety related areas illuminated by the ac emergency system. Verify that the access and egress corridors are illuminated by a minimum of 5 foot candles. Modify your design as necessary. (SRP 9.5.3, Parts I & II).

RESPONSE

The Illuminating Engineering Society (IES) lighting handbook, 1981, does not specifically recommend illuminance levels under emergency lighting condition but it does state that "Because of the very low illuminances provided by emergency lighting and because only escape routes need to be lighted, lux (footcandle) and watts per square meter (foot) are not suitable measuring criteria; adequate visibility is really the only suitable [illegible] design does conform to or exceed the IES handbook design requirements with regard to escape route identification, illumination of exit signs, egress route illumination and power supply systems. Thus, the HCGS "emergency lighting" design does provide adequate illumination to ensure that escape routes can be effectively identified and used when the normal lighting system is unavailable, all in accordance with IES recommendations.

With regard to illuminance levels for performing tasks under emergency lighting condition, Table 9.5-17 (see Question 430.70) identifies the illuminance levels, footcandles, available in the safe shutdown areas depending on the availability of the lighting subsystems. At least 10 footcandles are provided in the control room with either the essential ac or the 8-hour battery pack subsystem functional and at least 10 foot candles are provided in the remote shutdown panel room during the emergency lighting condition. The remaining two areas, diesel generator remote control panel rooms and the Class 1E switchgear rooms, contain backup electrical controls and indicators for the remote shutdown panel (RSP) and these areas are not required to be manned for safe shutdown. However, in the event that the controls and indicators need to be verified during safe shutdown from the RSP sufficient illumination is provided in these areas.

Response 430.73

Insert A

For all other areas listed on this table where the illuminance ~~levels~~ does not meet or exceed the staff levels,

lighting units be available to personnel performing tasks during the emergency lighting condition. The illuminance levels shown are approximate levels that can be expected at the equipment.

delete

2/2

Question 430.73

RESPONSE

Revised Table 9.5-17 identifies areas that are manned work stations during design basis accidents or during a loss of all ac power at the plant. At these particular locations (control room, remote shutdown panel room, and each diesel generator switchgear room) the lighting levels will be 10 ft candles from either the essential ac lighting system or the emergency 8-hour battery pack system. These particular work stations are areas where specific equipment require manual operation or monitoring of instrumentation meters.

The other safety-related areas that contain safety-related equipment have lighting levels less than 10 ft candles as identified on Table 9.5-17. If safety-related equipment in areas that have less than 10 ft candels of emergency ac lighting require repair or maintenance during or after an accident, portable lighting will be utilized to accommodate the repair to be the equipment. The portable lighting will be stored onsite for such emergencies and will be maintained and tested in accordance with the manufacturers recommended procedures and frequencies. This portable lighting will provide a minimum of 10 ft candles to the safety-related area.

The Hope Creek ingress and egress routes are listed in the Table 9.5-17. These ingress and egress routes have a lighting level of from 2 to 5 foot candles when the lighting is powered from the essential ac lighting system. During a station blackout, all station ac power is not available. In this condition, the HCGS ingress and egress routes have lighting from the 8-hour battery pack units and emergency lighting in the stairwells powered from the standby dc lighting system. The minimum level in the ingress and egress areas is 1 foot candles and 10 ft candles in the interconnecting stairwells. This provides adequate visibility for personnel to move through these areas. The Illuminating Engineering Society states that adequate visibility is the only suitable criteria for emergency escape routes (reference page 2-48). This also is similar to other plants that have been previously reviewed in accordance with SRP 9.5.3 Part II. The preoperational testing of the lighting systems will determine whether or not the lighting levels within the ingress and egress areas are sufficient for personnel.

QUESTION 430.74 (SECTION 9.5.3)

Section 9.5.3.2 of the FSAR describes the emergency lighting system which is composed of three subsystems. They are the 125 V dc, essential ac and eight hour battery lighting systems. A number of areas in the plant are served by one or more of these systems. All these systems are classified non-Class 1E and receive power from non-Class 1E sources, i.e., non-Class 1E station batteries for the dc lighting and the non-Class 1E MCC's fed from the emergency diesel generator for the ac lighting. Even though the essential ac lighting system may be powered from the diesel generators, it must be manually connected in the event of a LOCA. Assuming a failure or non-availability of any or all of these systems following a design basis event or a LOCA it is possible that portions of the plant particularly the control room may be without sufficient lighting or without lighting for an extended period of time during this design basis event. This is unacceptable. It is our position that adequate lighting be provided to all vital, hazardous, and safety-related areas needed for the safe shutdown of the reactor and the evacuation of personnel in the event of an accident. Modify your design to provide this necessary lighting. (SRP 9.5.3, Parts I and II)

RESPONSE

Although the power sources to the emergency lighting subsystem are non-Class 1E, except for the diesel generator source, it is unlikely that portions of the plant will be without sufficient lighting or without lighting for an extended period of time during a design basis event of seismic or LOCA. This assessment is justified as follows:

a. Control Room Lighting

The control room is served by three lighting systems-normal ac, essential ac and 8-hour battery pack systems. All the lighting components in this room are seismically analyzed and/or mounted to meet the Seismic Category II/I requirement (see Table 3.2-1). In the event that the essential ac system cannot be reconnected manually from the control room to the diesel generator source after the DBE, the self-contained 8-hour battery packs on selected lighting fixtures will automatically function to provide sufficient lighting. These self-contained power supplies have individual test feature and status indicating lights such that the operator can easily observe the operational status of each lighting fixture. Because periodic testing and maintenance ~~is~~ are performed on these 8-hour battery packs, it is unlikely

1/20

that there will be a complete failure of this emergency lighting subsystem.

b. Lighting for Other Areas

The lighting system for areas other than the control room is comprised of normal ac and one or more of the emergency lighting subsystems. The lighting components in safety related areas are mounted to meet the Seismic Category II/I requirement (see Table 3.2-1) and the self-contained 8-hour battery pack units have been seismically qualified. Areas required for safe shutdown have essential ac and 8-hour battery pack subsystems and areas for evacuation of personnel have as a minimum, the 8-hour battery pack subsystem for emergency lighting. Because the 8-hour battery pack units are subject to periodic testing and maintenance, this lighting subsystem will function to provide sufficient illumination until normal or other emergency lighting subsystem(s) is restored. In addition, the lighting system components are diverse in location and are powered from different power sources such that the possibility of insufficient lighting for an extended period of time is unlikely.

c. Lighting Following Seismic or LOCA Event

The non-Class IE motor control centers (MCCs) which supply power to the essential ac lighting system are designed and constructed the same as for Class IE MCCs. Therefore they are capable of withstanding a seismic event. After the LOCA event the manual reconnection of the essential ac lighting loads to the diesel generator sources will be performed ~~under administrative control~~ in accordance with station operating procedures which will require the reconnection be made no later than 8 hours after the MCC disconnection.

Insert E

Because the lighting system can be supplied from onsite power sources and ~~the~~ some lighting components are seismically analyzed or mounted, it is concluded that there will not be a total loss of lighting. However, in the event of loss of or insufficient lighting in some areas, station personnel will have access to hand-held portable lighting units.

(the 8 hour battery pack has successfully been seismically tested)

2/20

safety-related equipment, and access routes to and between and egress routes from these areas.

Table 9.5-17 lists the emergency lighting subsystems provided for areas where operators and other station personnel are needed to perform safe shutdown duties in the event of an accident. In the event of a prolonged loss of offsite power, each area will be illuminated by the self-contained, 8-hour battery pack units until the essential ac subsystem is manually reconnected to the standby diesel generator. For all other areas not listed on this table, at least one of the emergency lighting subsystems is provided in each area required for personnel safety and for access/egress purpose during an evacuation or fire. Insert A

9.5.3.3 Safety Evaluation

The lighting systems are not safety-related and are classified as non-Class 1E. However, components of lighting systems located above or adjacent to safety-related equipment are supported by Seismic Category II/I supports to protect safety-related equipment from damage during a seismic event. Insert B

The normal lighting system is designed such that offsite power supplies station lighting for normal plant operation, control and maintenance of equipment, and plant access routes.

Insert C

The integrated design of the emergency lighting systems uses onsite power and/or self-contained battery packs to provide adequate emergency station lighting in all areas required for control and maintenance of safety-related equipment, firefighting, and the access routes to and between and egress routes from these areas.

Figure 9.5-20 is the single line drawing for the lighting distribution system.

Illumination levels provided in various areas either conform to or exceed those required in the IES handbook. Insert D

9.5.4 STANDBY DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER

3/20

Insert [illegible]

The manual reconnection of the essential ac lighting loads to the diesel generator sources are performed ~~under (administrative control)~~ in accordance with station operating procedures. Hand-held portable lighting units will also be available to station personnel to provide supplemental lighting when necessary during a prolonged loss of offsite power condition.

Insert B to Page 9.5-72

In addition the control room lighting system is seismically qualified as part of the ceiling design.

Insert C to Page 9.5-72

The essential ac lighting system is designed to provide lighting from standby diesel generator sources through Class 1E unit substations and non-Class 1E MCCs. Although the non-Class 1E MCC are shed upon the ~~occurrence~~ loss of ~~a LOCA~~ normal ~~and~~ station ~~auxiliary~~ AC power, station operating procedures will require reconnection of the MCCs within 8 hours after the shedding. The non-Class 1E MCCs are designed and constructed the same as for Class 1E MCCs.

Insert D to Page 9.5-72

Station personnel will have access to hand-held portable lighting units when necessary for supplemental lighting.

Insert E to Page 430.74-2

THE NON CLASS 1E MCC'S WERE PURCHASED ON THE SAME TECHNICAL SPECIFICATIONS AS THE CLASS 1E MCC'S AND ARE THE SAME MANUFACTURER MODEL AS THE CLASS 1E MCC. THESE NON CLASS 1E MCC'S ARE MOUNTED SEISMICALLY AS THE CLASS 1E MCC'S AND ARE LOCATED IN SEISMIC CATOGARY 1 STRUCTURES.

4/20

QUESTION 430.75 (SECTION 9.5.3)

In Section 9.5.2.4 of the FSAR you state that inservice inspection tests, preventative maintenance, and operability checks are performed periodically to prove the availability of the communication systems. However no description is provided for the inservice inspection tests, preventative maintenance and operability checks to prove the availability of the emergency lighting systems. Describe the tests and checks that will be performed on the emergency lighting systems and their frequency. (SRP 9.5.3, Parts I & II).

RESPONSE

~~The frequency and extent of the periodic maintenance and testing of the three subsystems comprising the emergency lighting system will be performed using written preventive maintenance procedures in accordance with the frequencies specified in the station inspection order/preventive maintenance system or Technical Specifications.~~

Testing of the Class 1E feed will be performed in conjunction with the standby diesel generator load testing.

replace

¶ The emergency lighting systems will be demonstrated operable by energizing the lighting systems. Visual inspections will be performed: (1) semiannually for those areas of the plant that are accessible, (2) within 72 hours of achieving cold shutdown for those areas of the plant that are not accessible during plant operation, unless emergency lighting operability has been demonstrated in those areas within the past 6 months.

Add Attached

1/1

430.75

Additionally the D.C. emergency battery pack lighting units as well as stored onsite portable D.C. lighting packs will be tested on an 18 month interval in accordance with manufacturers recommendations to insure that rated illumination is available. As a minimum this will include the following:

A. Check of battery voltage
B. Fuctional Test of the unit via installed push button verifing lamp operations and position.

QUESTION 430.76 (SECTION 9.5.4)

In Section 9.5.4.5 of the FSAR you describe the instruments, controls, sensors and alarms provided for monitoring the diesel engine fuel oil storage and transfer system and their function which alert the operator when these parameters are exceed the ranges recommended by the engine manufacturer. Discuss the testing and the frequency of testing necessary to maintain and assure a highly reliable instrumentation, controls, sensors and alarm system. Describe what operator actions are required during alarm conditions to prevent harmful effects to the diesel engine. Discuss the system interlocks provided. (SRP 9.5.4, Part III)

RESPONSE

The testing of diesel generator instrumentation and control will be performed using written procedures and in accordance with the frequencies specified in the Hope Creek Technical Specifications. Those items not covered in that section will be tested in accordance with other written procedures. Available January 1985.

Operator actions during alarm conditions will be addressed in the appropriate alarm response procedure, OP-AR.JE-XXX series. Available January 1985.

The diesel fuel oil storage tank and diesel fuel oil day tank are interlocked as described in Section 9.5.4.2.3. The diesel fuel oil storage tank is interlocked with the diesel fuel oil fill station as described in Section 9.5.4.2.6.

Insert A here

1/8

RESPONSE

INSERT A page 1
to Q 430.76

The Instrumentation and Control Department will calibrate the instruments, controls, sensors and alarms required to assure operability of the diesel engine fuel oil transfer system. Table 430.76-1 provides an equipment summa and surveillance frequency. Calibration checks and calibration of the instruments, controls, sensors and alarms will be performed using written procedures

2/8

~~Insert B~~

Operator actions to preclude loss or conditions harmful to the diesel engine are provided in table 430.76-2.

The fill portion of the diesel engine fuel oil tranfer system is controled from one of four control stations. Interlocks are provided to prevent more than one control station from opening fill valve HV-7534. Additional interlocks close fill valve HV-7534 when the selected fuel oil storage tank has reached a high level setpoint and the control mode selection switch is in automatic. Soleniod valve SV-7534 and air operated fill valve HV-7534 are configured to automatically close the fill valve on either a loss of solenoid electrical power or a loss of control air. All interlocks provide protection against inadvertent fuel oil storage tank overfill.

The fuel oil transfer system is provided with the capability to automatically transfer fuel oil from a storage tank to a diesel engine fuel oil day tank. Two storage tanks are provided for each diesel engine. Each storage tank is provided with a fuel oil transfer pump. When the diesel engine day tank level is sensed low the selected fuel oil transfer pump automatically starts to supply fuel oil from the storage tank to the day tank. This control scheme assures continuous supply of fuel oil to the diesel engines.

TABLE 430.76-1

Diesel Engine Fuel Oil Transfer System

Instruments, Controls and Sensors

Syst.

Inst no.		Function	Surveillance Frequency*
[illegible]-7517	A-D	DAY TANK LVL	F
[illegible]-7502	A-D	DAY TANK TEMP	P
[illegible]AHL-7501	A-D	F.O. DAY TANK	F
[illegible]SHL-7530	A-D	F.O. DAY TANK LVL CONT	F
[illegible]-7505	A-D	F.O. SUCTION STRAINER ΔP	P
[illegible]-7506	A-D	F.O. FILTER ΔP	P
[illegible]-6504	A-D	F.O. STRAINER ΔP	F
[illegible] 6505	A-D	F.O. FILTER ΔP	F
[illegible]-7508	A-D	F.O. HEADER	F
[illegible]-7519	A-D	F.O. PUMP DISCH	P
[illegible]-7520	A-D	F.O. HEADER PRESS.	P
[illegible]-7507	A-D	F.O. TEMP	P
[illegible]-6501	A-D	F.O. FILTER IN/OUT (RCCP)	P
[illegible]-6502	A-D	F.O. PMP DISCH	F
[illegible]-7521	A-H	F.O. STORAGE TANK LVL A/B	F
[illegible]-7522	A-H	F.O. STORAGE TANK LVL (RCCP) A/B	F
[illegible]-7524	A-H	F.O. TRANSFER PMP PRESS	F

*[illegible]

P = 36 MONTH FREQUENCY

F = 18 MONTH FREQUENCY

* THE ABOVE SDG INSTRUMENTATION WILL BE CALIBRATED ON AN 18 MONTH SCHEDULE.

4/8

~~Response to Question 430.~~

TABLE 430.76-2

Summary of Operator Actions in Response to Diesel Engine Fuel Oil Storage and Transfer System Alarms

High Priority Alarms

a) FUEL OIL PRESSURE LOW

Check	Action
Operating pressures (locally)	If normal. Attempt to clear alarm If low. Proceed to next check
Suction valve open	Open valve in pump suction line if closed
Filter and strainer diff. pressure	If high - see applicable response summary.
Day tank level	If low - see applicable response summary
Motor driven pump auto start	If not confirm - Control switch CS-33 in AUTO. Power is available. Take manual control at CS-33 if necessary
Valve lineup to instrumentation and alarm switches	Open valves found in closed position
Piping System integrity from day tank to injectors	

b) FUEL OIL DAY TANK LEVEL LOW

Check	Action
Tank level locally	If normal: Attempt to clear alarm If low: Proceed to next check
Verify transfer pump auto start	If not: check for proper operation of LSHL 7530 control pump manually if required If running: Confirm valve lineup to day tank
Piping integrity	If piping is breached or restricted: Notify Shift Supervisor Crosstie and fill from f.o storage tank at another diesel if required

5/8

Low Priority Alarms

a) FUEL OIL DAY TANK LEVEL HIGH

Check	Action
Tank level (locally)	If normal: Attempt to clear alarm If high: Proceed to next check
Confirm transfer pump shutoff	If running: Stop pump manually Monitor day tank level Prevent low level alarm Notify I&C to repair level control

b) FUEL OIL STORAGE TANK NO. 1 LEVEL LOW

Check	Action
Tank level	If normal: Attempt to clear alarm If low. Proceed to next check
Tank and piping integrity	If leaks or obstructions are found. Isolate if possible Notify Shift Supervisor
Transfer pump running	Ensure fuel oil is not being pumped to main fuel oil storage tank

c) FUEL OIL STORAGE TANK NO. 2 LEVEL LOW

Check	Action
Same as response b	

d) FUEL OIL STORAGE TANK NO. 1 LEVEL HIGH

Check	Action
Tank level	If normal. Attempt to clear alarm If high. Proceed to next check
Storage tanks [redacted] being filled - level high	Ensure: alarming tank is not selected for fill proper operation of LSHH 7535 and HV 7534 Manually operate HV 7534 if required
Storage tanks ~~Tank~~ not being filled - level high	If transfer pump(s) are running, ensure crossties are not open Confirm valve lineup to main fuel oil storage tanks.

e) FUEL OIL STORAGE TANK NO. 2 LEVEL HIGH

Check	Action
Same as response f	

f) FUEL OIL FILTER DIFFERENTIAL PRESSURE HIGH

Check	Action
Confirm high filter dP	If normal. Attempt to clear alarm If high: Confirm instrumentation valve lineup Swap and clean filter

g) FUEL OIL STRAINER DIFFERENTIAL PRESSURE HIGH

Check	Action
Confirm high strainer dP	If normal: Attempt to clear alarm If high: Confirm instrumentation valve lineup Swap and clean filter

7/8

h) FUEL OIL TRANSFER PUMP NO. 1 MALFUNCTION

Check	Action
Confirm: Alarming pump is running Discharge pressure is low	If pump has not received a run signal Attempt to clear alarm If pump is running and pressure is normal: Notify I&C to repair alarm If pump has failed to run: Confirm CS-35 is in AUTO Attempt to control pump manually If discharge pressure is low: Confirm valve lineup to pump Notify I&C and Maintenance as required

i) FUEL OIL TRANSFER PUMP NO 2 MALFUNCTION

Check	Action
Same as response h	

j) FUEL OIL TRANSFER SYSTEM NOT IN AUTOMATIC

Check	Action
Position of CS34 and CS-35 Fuel Oil transfer pump control switches	If both switches are in AUTO: Attempt to clear alarm If either switch is not in AUTO: Confirm reason for switch position Return to AUTO when possible

QUESTION 430.80 (SECTION 9.5.4)

In Section 9.5.4.2.1 you discuss the corrosion protection both internal and external for the fuel oil storage tank. No discussion is provided on the corrosion protection provided for the fuel oil fill piping. Expand the FSAR to include a more explicit description of proposed protection of underground piping. Where corrosion protective coatings are being considered (piping and tanks) include the industry standards which will be used in their application. Also discuss what provisions will be made in the design of the fuel oil storage and transfer system in the use of a impressed current type cathodic protection system, in addition to water proof protective coatings, to minimize corrosion of burried piping or equipment. If cathodic protection is not being considered, provide your justification. (SRP 9.5.4, Part II)

RESPONSE

The diesel fuel oil transfer piping that is buried is primed and wrapped, in accordance with industry standards, AWWA C 203 including Appendix A1.5 and/or A2.0. The buried diesel fuel oil transfer piping is also cathodically protected.

The emergency fill line and connection is provided inside the diesel generator building. The buried fuel oil fill line is separated from the emergency fill line by a normally closed isolation valve, which is located inside the building, as shown on Figure 9.5-22.

3.5.8.0 Inservice inspection program for the fuel oil system cathodic protection system is not described.

SEE ATTACHED

1/5

Response 430.80

30.80 The diesel fuel oil transfer piping that is buried is primed and wrapped, in accordance with industry standards AWWA-C-203 including appendix A1.5 and/or A2.0. The buried portions of the diesel fuel oil transfer piping is [are] cathodically protected by an impressed current cathodic protection system ~~and is considered as non safety related piping~~. The impressed current cathodic protection system is also considered as a non safety related system ~~the site impressed current cathodic protection system will be tested in accordance with plant~~

2/5

(3)

430.80 (cont)

See Insert A

A The buried portion of the diesel fuel oil transfer piping is not considered safety related piping since an emergency fill connection is provided inside the diesel generator building, which can be isolated from the buried portion of the fill piping by an isolation valve which is located inside the building, as shown on Figure 9.5-22. This emergency fill connection provides a protected fill path to the diesel fuel oil storage

3/5

430.80 (cont) tanks, none of which is buried piping.

430.80 Revised Response

Insert A — AND THE TECHNICAL SPECIFICATIONS.

The diesel engine fuel oil transfer piping Cathodic Protection System will be tested and inspected per Maintenance Department preventive maintenance procedure MD-PM-QH-001 (Q) Cathodic Protection System P.M. The frequency and type of preventive maintenance activities are shown below:

2 Months

Rectifier unit will be visually inspected for physical damage and excessive heat. Output voltage and amperage will be recorded. (Adjustments made as needed). The interior and exterior of the unit will also be cleaned at this time.

12 Months

1. The anode test leads will be cleaned and verified to be adequately protected.

2. Preformance test of underground portion of system to determine if protection is adequate.

QUESTION 430.81 (SECTION 9.5.4)

In Section 9.5.4.2.1 of the FSAR you state that "The interior and exterior surfaces of the [fuel oil storage] tank are corrosion protected by carboline carbo zinc 11 coatings. I&E circular 77-15 discusses the incompatibility between diesel fuel oil and zinc. The reaction results in a substance resembling soap which when heated becomes insoluble and this substance could render diesel generators inoperable due to blocked fuel lines, injectors, etc. This is not acceptable. It is our position that fuel oil storage tanks be provided with internal corrosion protection. Therefore provide the results of tests which show that over the lifetime of the plant that the carboline carbo zinc 11 coating used is compatible with the type of diesel fuel oil that will be used at your plant and that the condition described in the circular will not occur or replace the internal coating with a non-zinc base type that is compatible with diesel fuel oil. (SRP 9.5.4, Part II)

RESPONSE

Bechtel is presently reviewing the use of Carboline Carbo Zinc 11 in diesel fuel oil storage tanks. A complete response will be submitted in May 1984.

1/1

430.81

As stated in Section 9.5.4.2.1 H.C.G.S.

diesel fuel oil storage tanks are coated with carboline carbo zinc 11, on the interior and exterior surfaces, for corrosion protection.

Coating of diesel fuel oil tanks with inorganic zinc, for corrosion purposes, has been a standard practice in the diesel fuel oil storage and transfer industry. It has been recorded, however, that there is a problem with the storage of

2/0

430.81 cont

diesel fuel oil in storage tanks lined with inorganic zinc if the diesel fuel oil has been processed from naphthenic based crude.

Inorganic zinc linings in the presence of diesel fuel oil refined from naphthenic based crude forms zinc naphthenate. Zinc naphthenate accelerates the oxidation of diesel fuel oil and promotes the formation of insoluable gels or gums, which ~~will~~ can clog fuel filters and foul injectors in diesel engines.

3/[illegible]

430.81 cont.

Napthenic based crude is the primary source of napthenic acid in diesel fuel oil. However, napthenic based crude represents a small percentage of the available crude supplies. The two major suppliers of napthenic based crude are California and Venezuela.

Refineries that do not process napthenic based crude oils do not have restrictions against the use of inorganic zinc lined tanks to store and transport No 1 and 4/6

430.81

No. 2 grade diesel fuel oil. Power plants have used inorganic zinc lined tanks to store diesel fuel oil and have not reported adverse effects on diesel fuel oil or the standby diesel engines.

In order to assure product purity for the use of diesel fuel in engines, NACE recommends a maximum neutralization number (ASTM D 974) of 0.05 for petroleum products to be stored in inorganic zinc lined tanks. HCGS will commit to a maximum diesel fuel neutralization number of 0.05. This requirement will ensure that diesel fuel oil degradation will not occur from the use of zinc linings in the diesel fuel oil storage tanks.

INSERT A

INSERT A

430.81

Colt Industries knows of no delitirious effects of minute traces of zinc being a problem to any parts of the diesel engine. It has to be assumed that any zinc in the fuel of ~~any~~ significant size would be removed by the fuel oil filtering system (particals greater than 5 microns). Smaller particals would not be any more concern than any other of the trace metals that may be present in the fuel oil.

QUESTION 430.82 (SECTION 9.5.4)

You state in the FSAR that protection from high and moderate energy pipe breaks is provided for the emergency diesel generators and discussed in Section 3.6. The emergency diesel generator air start and combustion air and exhaust systems are for your design high energy systems, but Section 3.6 does not provide any analysis for these systems. This is unacceptable. Identify all high and moderate energy lines and systems that will be installed in the diesel generator room. Discuss the measures that will be taken in the design of the diesel generator facility to protect the safety related systems, piping and components from the effects of high and moderate energy line failure to assure availability of the diesel generators when needed. (See request 430.120 and 430.149 for additional concerns on high energy line breaks with regard to the air start system and diesel engine exhaust system) (SRPs 9.5.4 - 9.5.8, Parts II and III)

RESPONSE

The standby diesel generator (SDG) combustion air exhaust system is not classified as high energy system because the SDG do not operate during normal plant conditions. According to the definitions provided in Section 3.6.3, the identification of the high and moderate energy systems is based on the normal plant conditions which are the plant operating conditions during reactor startup, power operation, hot standby, and reactor cooldown to cold shutdown condition. The SDGs do not operate during any of these plant conditions. They only operate during plant upset condition or during the SDG system testing. Therefore, the SDG engine exhaust system is not classified as a high energy system.

* Insert →

~~The air starting system is a high energy system. A discussion of the pipe break location, compartment pressure-temperature transients and verification of reactor shutdown capability is provided in Section 3.6.1.2.1.19.~~

* A description of the air starting system is given in the response to 430.120.

There are no other high energy lines in the diesel generator rooms. However, a moderate energy line, the SACS cooling water to the combustion air-water heat exchanger is located in the diesel generator rooms. The facility response, as discussed in revised Section 3.6.1.2.1.19, is applicable to a failure of this moderate energy line in the diesel generator room.

~~430.82 HIGH ENERGY LINE BREAK ANALYSIS FOR DIESEL ... 9.5.4 THRU 9.5.8 SYSTEMS — RESPONSE UNACCEPTABLE~~ 1/3

Insert

430.82

the potential for a leak in the system has been considered since the exhaust piping is routed through areas which contain safety-related equipment or panels. From elevation 130'-0", where the exhaust stack exits the exhaust silencer and is routed directly to the roof, to elevation 199'-0" the stack is enclosed in an

2/3

430.82 (cont): air tight three hour fire proof enclosure. A local smoke detector is located at the upper elevation of the stack enclosure. The smoke detector will detect any exhaust leakage in the enclosure from elevation 130'-0" upto elevation 199'-0". Only one smoke detector is required since, provisions have been made to ventilate the enclosure through the roof opening, creating a natural stack effect.

See additional response to question 430.149.

430.82

Insert 1

In addition to the criteria of SRP 3.6.1, the normally pressurized ASME portion of the air start system has been reviewed to ensure that any postulated piping failures can not cause the shutdown of the already running diesel generator.

Insert 2

Operation of the SDG is not required during the normal plant operating conditions defined in SRP 3.6.1, however, the fuel oil transfer line is pressurized by the static head of the fluid in the line while the SDG is not in operation. During SDG operation, the fuel oil transfer line is pressurized to approximately 47 psig. It is routed from the fuel oil storage tank at elevation 54' through the recirculation ventilation room (see Section 9.4.6) on elevation 77' to the respective fuel oil day tank on elevation 102'. Any cracks in this line would only effect systems associated with the diesel being served by that transfer line because of SDG compartmentalization. However, a review of the potential fire hazard created by the fluid spray was performed. The fuel oil would have to be heated above its flash point of 100°F by any potential ignition source. The fuel oil transfer pumps at elevation 54 are canned pumps. The ventilation fans are direct drive and completely contained within the distribution ductwork. These units contain no heating coils that could act as potential ignition sources.

QUESTION 430.83 (SECTION 3.2)

The FSAR text and Table 3.2-1 indicates that the components and piping systems for the diesel generator auxiliaries (fuel oil system, cooling water, lubrication, air starting, and intake and combustion system) that are mounted on the auxiliary skids are designed seismic Category I and are ASME Section III, Class 3. The engine mounted components and piping and certain other components listed in the various Sections of 9.5 and Table 3.2-1 are designed and manufactured to DEMA standards and/or manufacturer's standards and are seismic Category I. This is not in accordance with Regulatory Guide 1.26 which requires the entire diesel generator auxiliary systems be designed to ASME Section III Class 3 or Quality Group C. You also state that the figures in Section 9.5 show where quality group classification changes are. The figures do not provide this information. Provide the following: (a) the industry standards that were used in the design, manufacture, and inspection of the engine mounted piping and components, (b) show on the appropriate P&ID's where the Quality Group Classification changes from Quality Group C, and where the Seismic Category I portions of the system are located. Sections 9.5.4 through 9.5.8 and Table 3.2-1 define certain pumps, filters, strainers, valves, and subsystems in the diesel generator auxiliary systems as Quality Group D or not applicable with regards to Quality Group Classification. It is our position that all components and piping in the diesel generator auxiliary systems be designed to Seismic Category I ASME Section III Class 3 requirements. Comply with this position or justify noncompliance. (SRPs 9.5.4 - 9.5.8, Part III)

RESPONSE

a. The engine mounted piping systems (such as the lube oil headers, water headers, cylinder heads, etc) are manufactured to the manufacturer's proprietary design requirements which do not necessarily meet the requirements of ASME Section III or ANSI B.31. The components used are pressure tested and the manufacturing processes are monitored as part of the supplier's approved QA program. The major components are included in the seismic analysis.

INSERT A →

(It should be noted that the DEMA standard is not a design specification, but gives guidance as to what should be included in a performance type specification.)

b. The figure in Section 9.5 can be used to determine quality group classification and seismic boundaries. The diesel engine auxiliary system P&IDs (Figures 9.5-22, 25, and 28) indicate the piping line classes and the piping specification changes as defined on Figure 1.13-1, sheet 1 (P&ID legend). The third letter of the three-letter piping

430.83

Insert A

Piping on the engine of the category stated above that is non-ASME is considered to be moderate energy piping as defined by BTP ASB 3-1. This piping shall be examined to determine the equivalency of the piping to the design requirements of ANSI B.31.1. All such piping shall be verified to have met the design requirements for B.31.1 or a justification for other manufacturer's standards presented.

line class code indicates the code to which the piping and components are built. Tables 3.2-2 and 3.2-3 can then be used to determine the quality group classification based on the applicable code. The Seismic Category I boundaries are indicated by the Q-flags as indicated in Section 3.2.1.

Section 1.8.1.26 has been revised to include a clarification of Regulatory Guide 1.26, Revision 3, Position C.2.b with regard to engine-mounted components and piping.

The following concerns will be addressed by July, 1984:

a. The EDG air start system is a high energy system. All portions of the system which are high energy during standby and operations need to be ASME III, Class 3.b.

b. Verify or analyze that a pipe break in the air start system does not damage any other piping on the engine (of equal or less diameter).

c. Analysis or justification for parts that are not ASME is required.

d. Engine mounted piping generally meets the requirements of ANSI B31.1.

e. Verify compliance or indicate why equivalent.

INSERT B

2/7

430.83

Insert B

The diesel generator auxiliary systems were designed for the most part during the period from 1974 to 1977. Careful consideration was given to classifying essential system piping as ASME Section III, Class 3. This intent was reviewed at the construction permit stage and is reflected in Table 15.4-2 which specifies that the "diesel generator fuel supply piping from seven day storage tank to engines" is to be classified as Qualify Group C. It should be noted that it does not include other piping such as the diesel generator fill line. The guidance of Regulatory Guide 1.26 stated that systems not covered by this guide [include] diesel engine and its generators and auxiliary support systems, diesel fuel,..." and that these systems should be designed to quality standards "commensurate with the safety function to be performed."

that they were not

The position with respect to the diesel generator storage tank fill lines was [redacted] essential in that lengths of hoses would be available to be positioned such that fuel oil could be transferred directly to the tank through the manhole or the spare flange connection (see the response to Question 430.93).

During the construc·ion of the station, and following procurement of the piping for the fill lines (in early 1977), an evaluation was made regarding the design of the fill lines. In light of the NRC's interest in this particular fill line on other dockets, a decision was made to upgrade the piping to withstand the effects of an SSE. This piping was subsequently reanalyzed and supported similar to other Seismic Category I piping. In addition, the piping supports installation has ~~have~~ been inspected by the construction quality control organization under a 10 CFR 50, Appendix B, quality assurance inspection program.

The diesel fuel oil fill line, although not designed to the requirements of ASME Section III, Class 3, is designed, fabricated, and inspected commensurate with its safety function and provides an adequate level of safety based on the following:

1. The piping is designed to the standards of ANSI B.31.1.

2. The piping is designed to withstand the effects of an SSE without loss of function.

3. Installation of the supports for the piping are inspected under an 10 CFR 50, Appendix B, quality assurance program.

4. The fill line will experience little pressure during filling operations and is not pressurized when not in use.

The material specified is ASTM A106, Gr B which is identical to the comparable ASME SA-106

430.83

Insert B (Cont'd.)

5. The line is not critical in the early stages of an emergency and in the unlikely event it becomes unusable, sufficient time will likely be available to effect repairs. This is justified in that a normal seven day supply of fuel will be on site and available for use for each diesel generator.

6. The capability exists to fill the tanks with hoses that can be positioned to fill the tanks directly. Procedures shall be written to detail this emergency operation which will include the requirement for a dedicated fire watch who shall periodically patrol among the spaces containing the fill hoses when in use.

7. The piping shall be visually inspected on an ~~annual basis~~ inspection interval equal to the requirements of ASME Section XI for class 3 piping.

8. The piping shall be placed under the operational QA program for the station.

QUESTION 430.86 (SECTION 9.5.4)

In the FSAR you state the fire protection systems for the diesel generator fuel oil storage vaults are a manual deluge system and an automatic CO_2 systems. Both system as well as their associated detection, alarm, and actuation systems are nonsafety related systems and are not qualified for seismic events. The systems are seismically supported. Show that spurious actuation of the CO_2 fire protection system will not affect diesel generator availability and operability and describe the procedures that will be used to preclude the inadvertant operation of the manual deluge system from affecting diesel generator availability and operability during accident conditions.

RESPONSE

Even though the CO_2 system is not safety related, the CO_2 systems serving the diesel generator fuel oil storage vaults have seismically qualified components, such as the control panel, master and selector valves, thermal detectors, electro-manual pilot cabinets, and pushbutton stations, to avoid inadvertent discharge of CO_2 during a seismic event. (Reference Section 9.5.1.1.4 and Figure 9.5-17)

To prevent inadvertent discharge of water from the manual deluge systems during a seismic event, the outside screw and yoke gate valve for each system is kept closed. Since the gate valve is closed, the system can not discharge water unless the operator manually opens the gate valve and the deluge valve. ~~The operator will not actuate the system unless there is a fire.~~ In addition, if the system has been actuated, the other three tank vaults and equipment are available for use by the diesel generators.

insert

1/7

INSERT

430.86 The fire protection in each of the diesel generator fuel oil storage tank rooms consists of an early warning smoke and fire detection system, an automatic CO_2 total flooding system, a manual deluge system (which serves as a backup to the CO_2 system, fire water hose stations and portable extinguishers.

The early warning smoke and fire detection system consists of two (2) infared flame detectors and two (2) photo electric smoke detectors mounted on the

2/7

130.86 (cont)

ceilings. If a fire occurs, the early warning detection system will detect the fire, by either the smoke or flame detectors, and will register an alarm at the local detection control panel and in the main control room.

Thermal detectors are utilized to actuate the automatic CO_2 total flooding system. There are seven (7) thermal detectors per room, which actuates at 160°F. A warning alarm will be initiated in the diesel fuel oil storage tank room and on the local CO_2 system control panel and in control room prior to the release of CO_2. The

3/7

30.86 (cont) alarm will allow personnel in the area sufficient time to evacuate the room prior to the release of the CO_2.

The CO_2 system in the rooms can also be manually actuated from a pushbutton station located outside the respective diesel fuel oil storage tank room adjacent to its associated tank.

There are two (2) water hose stations located in the corridor outside of the diesel fuel storage tank rooms. Each station is equipped with a hose capable of reaching the diesel fuel oil storage tank room with at least one hose stream

cont 4/7

0.86(cont) to combat fires.

The final permanently installed system to combat fires in the diesel fuel oil storage tank room is the deluge system. This system is actuated by manually opening a gate valve and actuating a pushbutton on the local control panel or a pushbutton station located next to the entrance door.

#1 The fire alarms for the early warning fire and ~~smoke~~ detection system and the thermal detection for the CO_2 flooding systems are registered locally and in the control roo

5/7

430.86 (cont) on the fire protection status panel (10C671).

The location of the detector registering an ~~alarm and location of the alarm~~ is printed out at the fire protection status panel in the order that the alarms are received. The receipt of an alarm, indicating fire, without first the receipt of an early warning alarm would indicate a possible spurious actuation of the CO_2 system. This information would be passed to the fire brigade dispatched to investigate the cause of the alarm.

Fire brigade personel dispatched to investigate fire alarms will be briefed in the

430.86 (cont.) ~~in the~~ methods to be utilized to determine if an alarm is spurious or if there is an actual fire condition.

Design features of the fire protection system and personnel training programs, in response to fire alarms, will prevent the inadvertent actuation of the deluge system, in the diesel fuel oil storage tank rooms, if the CO_2 system is inadvertently actuated and/or a spurious alarm is received?

Insert A

430.86

Fire Brigade Personnel training will include initial actions upon arrival at the fire scene. For the diesel fuel oil storage tanks this will include:

1) Door exterior elevated temperature or discoloration
2) Failure of the cardox system to discharge following an initiation signal.

QUESTION 430.96 (SECTION 9.5.4)

The same line described in Request 430.95 above is used as a means of replenishing the day tanks of any diesel generator from the other D/G fuel oil storage tanks. This is an acceptable design. The figures provided inthe FSAR do not show whether this is located in the diesel generator rooms or the fuel oil storage tank vaults. In either event damage to this line could result in flooding of any one of the rooms with fuel oil, thus creating a fire hazard and possible loss of more than one diesel generator. This is unacceptable. It is our position that isolation valves similar to the ones required in Request 430.93b be provided in this line. (SRP 9.5.4, Part II & III)

RESPONSE

The portion of the diesel fuel oil transfer piping, in the diesel generator area, used to transfer diesel fuel oil to the auxiliary boiler fuel oil storage tanks or another diesel's fuel oil day tank is seismically analyzed. The piping is routed through compartments that are separated by fire boundaries. The consequences of a pipe break in any one of these compartments would only affect one diesel generator unit. The rooms are provided with oily waste drains to minimize the effects of spillage.

Insert A →

The piping outside the diesel generator room is located in areas covered by fire protection, in the auxiliary building diesel generator area, as discussed in Section 9.5 1.1.10 and response to Question 430.99 which references figures covering these areas.

INSERT B →

Diesel fuel oil transfer piping from the diesel fuel oil storage tanks to the auxiliary boiler fuel oil storage tank is not normally pressurized piping and has the capability of being drained after use. The piping is also isolated from the line from the diesel fuel oil storage tank to the fuel oil day tank by a normally locked closed isolation valve.

Addition of another isolation valve for this case would not increase the reliability of the system and in fact would decrease the flexibility of the design to cross-transfer fuel to other tanks when any of the tank vaults become inaccessible.

[redacted]

1/2

430.96

Insert A

During transfer of diesel fuel oil from a fuel storage tank to the auxiliary boiler fuel oil storage tank or during replenishment of the day tanks of a diesel generator from the other diesel generator storage tanks a roving fire watch will:

1. Monitor transfer pipe integrity,

2. Check for the presence of fire.

3. Communication capability between fire watch and pump station to allow securing pumps in case of fire

Additionally the transfer valves to the common discharge header will be locked closed and under administrative control.

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B Insert

430.96 The common portion of the diesel fuel oil transfer piping to the auxiliary boiler fuel oil storage tank, is located outside of the diesel generator ventilation rooms (EL 77'-0") in a common corridor. The corridor is bounded by three hour fire barriers as discussed in Section 9.5.1.1.10. The failure of the common portion of the diesel fuel oil transfer piping to the auxiliary boiler fuel oil day tank will not cause the loss of a diesel generator.

QUESTION 430.100 (SECTION 9.5.5)

Section 9.5.5 indicates that the function of the diesel generator cooling water system is to dissipate the heat transferred through the: 1) engine water jacket, 2) turbo-charger 3) engine air water coolers, 4) bearings, and 5) governor lube oil cooler. Provide information on the individual component heat removal rates (But/hr), flow (lbs/hr), temperature differentials (°F), inlet and outlet temperatures (°F) and the total heat removal rate required. Also provide the design margin (excess heat removal capacity) included in the design of major components and subsystems. (SRP 9.5.5, Parts II & III).

RESPONSE

As described in Section 9.5.5, the diesel generator cooling water system is comprised of the following two subsystem:

a. Jacket water cooling loop
b. Intercooler and injector cooling loop (provides cooling to turbo-charger, bearings, and combustion air)

generator outboard

Tables 9.5-6 and 9.5-7 have been revised to include the requested information on the respective heat exchangers. Total design heat removal rate for these heat exchangers is 8,530,000 Btu/hr. Both of these heat exchangers and the safety auxiliaries cooling system are designed to remove 110% of the design rating heat load.

a summary of the heat loads, flow rates and differential temperatures for the above components as follows:

Insert T

1/2

Insert 1, Sheet 1

TABLE 430.100-1

Component	Design Pressure PSIG	Flow Capacity GPM	Temperature Difference °F	Design Heat Removal Rate BTU/HR	Design Margin BTU/HR	Total Design Heat Removal Rate BTU/HR
PUMPS						
Jacket Water Engine Driven	57	850	-	-	-	-
Jacket Water Motor Driven CIRC Pump	10	60	-	-	-	-
Intercooler Water - Engine Driven	57	850	-	-	-	-
Lube Oil-Main Engine Driven	150	400	-	-	-	-
Lube Oil - Motor Driven Prelube	150	50	-	-	-	-

HEAT EXCHANGER EQUIPMENT - Jacket Water System

Component	Design Pressure PSIG	Flow Capacity GPM	Temperature Difference °F	Design Heat Removal Rate BTU/HR	Design Margin BTU/HR	Total Design Heat Removal Rate BTU/HR
Cyl. Liners, Jackets & Cyl. Heads & Turbo-chargers		-	15(Normal) 18(Maximum)	5,409,000	-	-
Gov. Heat Exch.		.5	(10°)	3,000	-	-
Jacket Water Heat Exch.	150			5,412,000	541,000	5,953,000
Intercooler water system Intercoolers	150		5-10°	3,101,000		
Injection Nozzles			(10°)	11,000		
Outboard Bearing (Gen)			(10°)	6,000		
Intercooler Heat Exch.	150			3,118,000	614,000	3,732,000
Lube Oil System						
Lube Oil Heat Exchanger	150		8(Normal) 10(Maximum)	1,353,000	135,000	1,488,000
TOTAL HEAT REJECTION - DIESEL ENGINE -				9,883,000		

QUESTION 430.101 (SECTION 9.5.5)

Provide the results of a failure mode and effects analysis to show that failure of a piping connection between subsystems (engine water jacket, lube oil cooler, governor lube oil cooler, and engine air inter-cooler) will not degrade engine performance or cause engine failure. (SRP 9.5.5, Parts II & III)

RESPONSE

The interconnecting piping (SACS water side) between the intercooler heat exchanger, jacket water heat exchanger, and lube oil heat exchanger, is moderate energy piping and is designed to Seismic Category I Criteria. As discussed in Section 9.2.2, during an LOP/LOCA each of the two SACS loops provide cooling to the two diesel engines dedicated to each loop. However, if one of the loops is inoperative, the two diesel engines dedicated to this loop will be re-aligned to the operating loop by manually opening the valves in the intertie lines. If a pipe break occurs in the interconnecting piping between the cooling subsystems of a diesel engine which results in leakage exceeding the makeup supply capability, the low-low switch in the expansion tank will ultimately activate an alarm in the main control room. This diesel engine will then be isolated from the SACS by manually closing the isolation valves (shown on Figure 9.2-5). Therefore, failure of the cooling water piping will cause loss of cooling water supply to only one diesel engine. Loss of cooling water will result in shutdown of this diesel engine. However, as stated in Section 7.5.5.3, since only three of the four SDGs are required for safety loads, failure of the SDG does not preclude safe shutdown of the plant following LOCA/LOP.

9.5.4.3

[redacted]

See attached for additional response.

Insert

INSERT A →

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Insert

4. .101

The design basis for the safety auxiliary cooling system (SACS) is that no single active failure can disable an entire loop. The SACS is also designed to prevent a complete loss of function due to a passive failure during the long term containment cooling mode following a LOCA. Leakage from a passive failure is assumed equivalent to that resulting from pump seal failure. The rate of leakage is such that after receipt of a Low-Low 2/3

(cont)

6

SACS expansion tank alarm sufficient operator action time, approximately 30 minutes, is available to realign the diesel generator cooling to the remaining SACS loop.

A draft copy of the SACS Tech. Spec 3/4.7 ~~Limiting Co.~~ "Limiting Condition for Operation" is attached.

proposed draft technical specifications for the SACS system

INSERT A

to be submitted for review and approval by the NRC

The ~~SACS Tech Spec.~~ will contain the following conditions:

1. With one SACS pump inoperable, restore the inopperable pump to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With one SACS pump in each subsystem inoperable, restore at least one inoperable pump to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

3. With one SACS subsystem inoperable, restore the inoperable subsystem to OPERABLE status with at least one OPERABLE pump within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

4. With both SACS subsystems inoperable, restore at least one subsystem to OPERABLE status within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN* within the following 24 hours.

QUESTION 430.104 (SECTION 9.5.5)

Describe the instrumentation, controls, sensors and alarms provided for monitoring of the diesel engine cooling water system and describe their function. Discuss the testing necessary to maintain and assure a highly reliable instrumentation, controls, sensors, and alarm system, and where the alarms are annunciated. Identify the temperature, pressure, level, and flow (where applicable) sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer and describe what operator actions are required during alarm conditions to prevent harmful effects to the diesel engine. Discuss the systems interlocks provided. (SRP 9.5.6, Part III)

RESPONSE

The instrumentation, controls, sensors and alarms are described in Section 9.5.5. The testing of diesel engine instrumentation and control will be performed using written procedures and in accordance with the frequencies specified in the Hope Creek Technical Specifications. Those items not covered in that section will be tested in accordance with other written procedures. Alarm locations are discussed in Section 8.3.1.1.3. Section 9.5.5.5 has been revised to identify the temperature, pressure, and level parameters which alert the operator when the manufacturer's recommended ranges are exceeded, and also, to include the system interlock. Operator action during alarm conditions will be addressed by the appropriate alarm response procedure, OP-AR.EG-XXX series. Available January 1985.

Insert A here

1/8

430.1.04

RESPONSE 2/8

INSERT A page 1

The instrumentation controls, sensors and alarms are described in section 9.5.5. The Instrumentation and Controls Department will perform the calibration checks and calibration of instrumentation, controls, sensors and alarm necessary to maintain and assure operability of the diesel engine cooling water system. The equipment, function and surveillance frequency is provided in Table 430.104-1. Equipment testing will be performed in accordance with written procedures. Alarm locations are discussed in Section

~~Insert B~~

Insert A (Cont'd) page 2

8.3.1.1.3. Section 9.5.5.5 has been revised to identify the temperature, pressure and level parameters which alert the operator when the manufacturer's recommended ranges are exceeded. Operator response to alarm conditions is summarized in Table 430.104-2.

The diesel generator cooling water system is provided with automatic refill of the jacket cooling water expansion tank from the demineralized water system. Heaters prewarm the jacket cooling water when water temperature decreases below a preset temperature limit. These automatic controls maintain the diesel engine cooling water system in standby readiness.

The diesel engine starting logic does not require permis signals from the diesel engine cooling water system. Nor and emergency starts of the diesel engine will not be inhibited. The diesel engine trip and stopping circuits cann be actuated by cooling water system malfunctions or related instrument failures.

TABLE 430.104-11

DIESEL GENERATOR JACKET WATER SYSTEM.

System ID	INST NO		~~MANUFACTURER~~	~~MODEL NO~~	FUNCTION	~~PROC TYPE~~	Surveillance Frequency * ~~10 END~~	
KJ	LSHL-3827	A-D	MAGNETROL	A-103-F	JACKET WATER EXPANSION TANK	DC	F	F
KJ	PSL-6612	A-D	ASCO	SB-11	J.W. PRESS / DETECTS ENG SPEED.	DC	F	F
KJ	PSL-6613	A-D	ASCO	SB-11	JACKET WATER PRESS	DC	F	F
KJ	PT-7739	A-D	FAIRCHILD	MODEL 20	JACKET WATER PRESS	CC	P	P
KJ	TE-7840	A-D	ASHCROFT	EI	J.W. HX OUT	DC	P	P
KJ	TE-7841	A-D	"	"	J.W. HX IN	DC	P	P
KJ	TE-7842	A-D	"	"	J.W. KEEPWARM HX OUT	DC	P	P
KJ	TE-7843	A-D	"	"	J.W. PUMP OUT	DC	P	P
KJ	TS-6611	A-D	ASCO	SB-11	J.W. HEATER THERMOS.	DC	F	F
KJ	TSH-6609	A-D	"	"	J.W. TEMP	DC	F	F
KJ	TSH-6610	A-D	"	"	J.W. KEEPWARM TEMP	DC	F	F
KJ	TSL-6607	A-D	"	"	J.W. TEMP	DC	F	F
KJ	TSL-6608	A-D	"	"	J.W. KEEPWARM TEMP.	DC	F	F
KJ	PI-7799	A-D	~~ASHCROFT~~	1377A	J.W. PMP DISCH (RECP)	CC	P	P
KJ	TI-6614	A1-D1	Honeywell	DIALATROL	J.W. TEMP	DC	F	F
KJ	TI-6614	A2-D2	"	"	" "	DC	F	F

* [redacted]

4/8

TABLE 430.104-1

INTERCOOLER WATER SYSTEM

System	INST NO.		~~Manufacturer~~	~~Model~~	FUNCTION	~~Type~~	Surveillance Frequency* ~~Interval~~ F/R	
KJ	PSL-6621	A-D	ASCO	SB-11	INTERCOOLER WATER PRESS	DC	F	F
KJ	DT-6631	A-D	FAIRCHILD	MODEL 3D	INTERCOOLER PUMP DISCH.	CC	P	P
KJ	TI-6624	A-D	ASHCROFT	EI	INTERCOOLER PUMP OUT	DC	P	P
KJ	TI-6625	A-D	"	"	INTERCOOLER HX OUT	DC	P	P
KJ	TI-6626	A-D	"	"	INTERCOOLER HX IN	DC	P	P
KJ	TI-6627	A-D	"	"	D.G. WATER OUT TEMP.	DC	P	P
KJ	TSH-6620	A-D	ASCO	SB-11	INTERCOOLER WATER TEMP.	DC	F	F

* THE ABOVE INSTRUMENTATION WILL BE CALIBRATED ON A 18 MONTH SCHEDULE.

* ~~Surveillance Frequency~~
~~F = 18 months~~
P = ~~36 months~~

5/8

TABLE 430.104-2

~~Response to Question 430.104~~

Summary of Operator Actions in Response to Diesel Engine Tubing Cooling Water System Alarms.

High Priority Alarms:

a) JACKET WATER PRESSURE LOW

Check	Action
Instrument valve lineup	Open valves to switch and gauge if closed
Pressure indication	If normal. Attempt to clear alarm
Piping and flex coupling integrity	If leaks or obstructions exist
Engine driven pump operability	

b) JACKET WATER TEMPERATURE HIGH

Check	Action
Operating temperature indications	If normal: Attempt to clear alarm
Operation of temp control valve	
Engine driven pump operability	
Flow of SACS cooling water	Open SV2395 if closed

4/E

c) JACKET WATER TEMPERATURE LOW

Check	Action
Operating temperature indications	If normal: Attempt to clear alarm
Operation of temp. control valve	Fail open design may cause this condition. Notify Maintenance to repair when possible.

d) JACKET WATER EXPANSION TANK LEVEL LOW

Check	Action
LSHL 7527 operating properly	If normal: Attempt to clear alarm If switch has failed, operate SV6015 manually until alarm condition is cleared
Makeup demin water is available	Ensure pump is running and proper valve lineup
Drain valve position	Close drain valve and cap discharge pipe if leak exists.
Piping and flex coupling integrity	

Low Priority Alarms

a) JACKET WATER KEEP WARM TEMPERATURE HIGH

Check	Action
J.W. heater outlet temperature	If normal. Attempt to clear alarm
J.W. keepwarm pump operating	Confirm power is available to the pump pump control switch is in AUTO Notify Maintenance if required.
Heater thermostat operating	If not: manually control heater to clear alarm Notify I&C to repair thermostat

b) JACKET WATER KEEP WARM TEMPERATURE LOW

Check	Action
J.W. heater outlet temperature	If normal. Attempt to clear alarm
Position of pump and heater controls	Place switches CS 39 and CS 40 in AUTO
keepwarm pump and heater operating	Confirm. power is available to both components heater thermostat is operating Notify maintenance if required

7/8

c) JACKET WATER EXPANSION TANK LEVEL HIGH

Check	Action
LSHL 7527 operating properly	If normal: Attempt to clear alarm
SV6615 is closed	Manually close SV6615 if open
Tank over flow	If over flowing, drain tank to clear alarm

d) JACKET WATER EXPANSION TANK FILLING

Check	Action
SV6615 is open	If not: If low level alarm occurs, manually open SV6615 to clear alarm If open: Confirm SV6615 closes before high level alarm is initiated

8/8

QUESTION 430.108 (SECTION 9.5.5)

Recent licensee event reports have shown that tube leaks are being experienced in the heat exchangers of diesel engine jacket cooling water systems with resultant engine failure to start on demand. Provide a discussion of the means used to detect tube leakage and the corrective measures that will be taken. Include jacket water leakage into the lube oil system (standby mode), lube oil leakage into the jacket water (operating mode), jacket water leakage into the engine air intake and governor system (operating or standby mode). Provide the permissable inleakage or outleakage in each of the above conditions which can be tolerated without degrading engine performance or causing engine failure. The discussion should also include the effects of jacket water/service water systems leakage. (SRP 9.5.5, Parts II & III)

RESPONSE

The heat exchangers are procured to ASME Section III design and and quality requirements, and are seismically qualified. ← INSERT 1

The cooling water systems chemistry will be analyzed in accordance with plant operating procedures which will indicate the presence of oil leakage into the systems.

Generally, lube oil in the water systems has no detrimental effect on the engine. ~~However,~~ water in the lube oil could be of concern.

INSERT 2 The diesel engine lube oil will be monitored and analyzed in accordance with the particular lube oil supplier's recommendations and diesel manufacturer operation and maintenance procedures, as described in Question 430.125.

The rocker arm lubrication system is separated from the main lubrication system because of the proximity of the rocker system to sources of water (cylinder heads, rocker assemblies, etc). Addition of water to that system, due to leakage, would be detected by the high rocker arm tank level alarm.

However since the JACS cooling water pressure & will always be higher than the pressure in the oil systems it is cooling, leakage will always be from the water systems into the oil systems thus

430.108

INSERT 1

The heat exchangers in these systems are hydrostatically tested, in accordance with the Code, prior to installation and startup.

The cooling water for the tube and shell side of the jacket water cooler and the intercooler heat exchanger, and the tube side of the lube oil heat exchanger is demineralized water treated with corrosion inhibitors. Treated demineralized water is also used to cool the governor oil. The tube material for

420.108 cont

Insert 1 cont

lube oil, jacketwater and intercooler heat exchangers is corrosion resistant 90/10 copper nickel.

These design provisions give reasonable assurance that the heat exchangers will last the 40 year design life without leakage. The diesel manufacturer has confirmed that their past operating experience with similar designs has not shown leakage to be a problem.

Insert 2

~~However~~ The diesel engine manufacturer does not have prescribed acceptable leak rates or limits since these parameters are peculiar to the type of lube oil being used in the units. The rockerarm lube oil will be monitored ~~for the~~ presence of water, if an amount of water is present in the rockerarm lube oil ~~above~~

3/5

43a108 cont

The intercooler (combustion air cooler) cools the combustion air after compression. During the cooling process moisture in the combustion air is condensed. The condensate collects at the outlet of the cooler after passing through stationary baffle plates which remove moisture, and is drained through an open 3/4 inch line which is vented. If a leak in the intercooler occurs the excessive moisture would be detected by the presence of higher than normal spray from the drain line. The diesel engine manufacturer has indicated that during engine operation there is little or no moisture dripping from the

430.108 (cont) (8)

drain. However, during operation in high humidity (95-100%) and high air temperature there would be a spray from the drain.

The governor control oil is sensitive to contamination by sludge, dirt, air and water. The governor oil will be checked according to plant operating procedures. If the sample is found to have water contamination, the governor oil will be drained and the cooler checked for leaks. If a leak is found, the cooler will be replaced.

5/5

QUESTION 430.113 (SECTION 9.5.5)

Figure 9.5-23 of the FSAR shows the fuel injector cooling subsystem of the diesel engine cooling water systems. The drawing shows the flow of cooling water to the fuel injectors as going from the hot leg (inlet) of the intercooler heat exchanger through a three way thermostatic valve (refer to request 430.110 for purpose of this valve) through the fuel injectors and to the expansion tank. The line is labeled 8 gpm at 120°F. Preheating during standby conditions to enhance first try starting reliability of the emergency diesel generator is not provided for this intercooler and injector cooling water system. Insufficient data and description is given on this system (See Request 430.100) to determine the purpose and adequacy of the system. It appears from the drawing that instead of cooling the fuel injectors the purpose of the system is to preheat the diesel fuel oil prior to injection into the cylinders. Provide the following:

a. Describe the purpose of the fuel injector portion in the diesel engine cooling water system. Since the hot leg of the cooling system would normally exceed 120°F, justify the design of the system as described above or correct the design and justify why preheating is not provided to this portion of the diesel engine cooling water system during standby operations to enhance first try starting reliability.

b. Justify why preheating of the balance of the intercooler and injector diesel engine cooling water system during standby conditions to enhance first try starting reliability of the diesel generator is not provided.

(See Request 430.145 for conditions when preheating may be necessary) (SRP 9.5.5, Part III).

RESPONSE

a. The injector cooling system furnishes cooling water to the fuel injector nozzles. This cooling water functions to extend injector nozzle life by removing the heat resulting from fuel oil combustion.

The optimum water temperature for cooling the injection nozzles is about 120°F (range: 110° to 140°F). Hotter water from the jacket water system is mixed with cooler water from the intercooler water system in the thermostatic 3-way proportioning valve to maintain this temperature. The mixed water is then directed through headers on the two cylinder banks to the injection nozzles on each cylinder. The water then flows into return headers for each cylinder bank and is piped to the jacket water expansion tank, returning to the jacket water and intercooler water systems through the pump surge lines.

b. The purpose of the system is not to preheat the fuel oil, but to cool the injection nozzles as described in part (a). Thus, the system is not required to operate during standby operation.

c. The manufacturer has confirmed that the first try starting reliability of the diesel generators is unaffected by the intercooler's initial cooling water temperature, and as such, does not require cooling water preheat during standby conditions.

(1)

430.113

INSERT A

The 3-way thermostatic control valve, which is described in response to question 430.110, is located in the two systems such that if heating or cooling of the injector cooling water is necessary to attain the 120°F optimum cooling water temperature, the required amount of water is added from the jacket water system and the intercooler water systems as necessary.

Failure of the 3-way thermostatic control valve in either position, causing all jacket water ~~flow~~ or all intercooler water ~~flow~~ to flow to the

430.113 (cont.)

(INSERT) cont.

injector nozzles, would not have an adverse effect on the diesel fuel oil injector nozzles. If failure of the 3-way thermostatic valve occurred in either position the cooling water to the injector nozzles could not get any hotter than the jacket water cooler outlet temperature (166.6°F) or any cooler than the intercooler heat exchanger outlet temperature (110°F). Colt Industries has confirmed that the nominal temperature spread between the jacket water cooler outlet and

430. 113 (cont.)

(INSERT A) cont. the intercooler heat exchanger outlet is not sufficient to cause any problems in the injector cooling system.

INSERT B

Colt Industries has confirmed that the injector cooling water system is for cooling the diesel fuel oil injector nozzles and is not intended for preheating of the nozzles.

QUESTION 430.115 (SECTION 9.5.6)

Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine air starting system, and describe their function. Describe the testing necessary to maintain a highly reliable instrumentation, control, sensores and alarm system and where the alarms are annunciated. Identify the temperature, pressure and level sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer and describe any operator actions required during alarm conditions to prevent harmful effects to the diesel engine. Discuss system interlocks provided. Revise your FSAR accordingly. (SRP 9.5.6, Part III)

RESPONSE

The instrumentation controls, sensors and alarms are described in Sections 9.5.6.3 and 9.5.6.5.

For the testing frequency and where the alarms are annunciated see response to Question 430.104.

Only pressure controls are utilized in the starting air system; temperature and level sensors are not applicable.

As described in Section 9.5.6.3 a low pressure alarm on each of the air trains alerts the operator of system trouble in the control room. Safety relief valves on the receivers/air trains protect the system from overpressurization and operator action is not required to protect the engine during a trouble alarm (Reference Section 9.5.6.3). The system is interlocked with the engine barring gear to prevent inadvertent start attempts while the unit is under maintenance.

Insert A here

1/7

INSERT A page 1

Only pressure controls and instrumentation are utilized in the starting air system; temperature and level sensors are not applicable. A summary of the equipment and surveillance frequency is provided on Table 430.115-1.

As described in section 9.5.6.3 a low pressure alarm on each of the air trains alerts the operator of system trouble in the control room. Operator response to diesel engine starting air system alarms is summarized in Table 430.115-2. Safety relief valves on the receivers / air trains protect the system from over pressurization.

The diesel engine air starting system air compressor starts automatically when air accumulator pressure decreases to 380 psi and stops the compressor at 425 psi increasing. The system is disabled by the barring gear interlock which is used to prevent diesel engine operation during maintenance

A high pressure alarm is not provided because the relief valves are over sized 450 SCFM as compared to the compressor output of 25 SCFM, and if the compressor failed to shutoff at their high point setting, the plant operations personnel would easily hear the relief valves relieving pressure.

BECHTEL

Diesel Engine
Starting & Control Air System

Item ID	Inst No		Manufacturer	Model	Function		Type	Surveillance Frequency*		
KJ	PI-7523	A-H	Ashcroft	1279	Air Start Receiver Tanks		DC	P	P	P
KJ	PIC-7543	A-D	Circle Seal	[illegible]-251	Const Air Press		DC	P	P	P
KJ	PSHL-6825	A-H	ASCO	SB-11	Start Air Comp. Control		DC	P	P	P
KJ	PI-7554	A1-D2	Ashcroft	1279A	Start Air Press	(@ LCP)	DC	P	P	P
KJ	PSL-7555	A1-D2	ASCO	SB-11	Start Air Press		DC	F	F	F

*Surveillance Frequency

F = 18 months
P = 36 months

4/7

TABLE 430.115-2

~~Response to Question 430.115~~

Summary of Operator Actions in Response to Diesel Engine Air Starting System Alarms.

<u>High Priority</u>

a) STARTING AIR PRESSURE LOW

Check	Action
Air header pressure	If normal. Check valve lineup to sensors Attempt to clear alarm
	If low: Proceed to next step
Receiver pressure	If normal Check valve lineup to air start distributors
	If low: Proceed to next step
Valve lineup to receivers	Open valves if closed
Compressor running	If stopped: Confirm valve lineup to start switch Ensure power to compressor
Piping and flex couplings	If leaks or obstructions exist; Isolate leak if possible Notify Shift Supervisor

5/7

b) START FAILURE CRANKSHAFT NOT ROTATING

Check	Action
Barring device	If engaged: Check reason for engagement Disengage when possible
Engine trouble shutdown	Ensure shutdown has been reset
Control power available	Ensure circuit #3 is energized Notify Maintenance if repairs are required
Maintenance switch position	If 43 switch is not in REMOTE: Check reason for position Return to REMOTE when possible:
Hand switch position	If HSS switch is not in NORMAL: Check reason for position Return to NORMAL when possible
If the diesel still fails to start, manually start at:	Control room panel remote engine panel local engine panel Air start solenoid valve

a) START FAILURE CRANKSHAFT ROTATING

Check	Action
Fuel system	If fuel system problems exist, respond in accordance with applicable alarm response
Air intake system	Check condition of air intake filters, piping, flex connectors, and intake manifolds.

Low Priority.

a) ENGINE LOCKED OUT FOR MAINTENANCE

Check	Action
Position of maintenance switch (83)	If switch is in MAINTENANCE position: Check reason for switch position Return to REMOTE when possible If switch is in REMOTE position: Attempt to clear alarm

b) DIESEL ENGINE IN LOCAL CONTROL

Check	Action
Position of maintenance switch (83)	If switch is in LOCAL position: Check reason for switch position Return to REMOTE when possible If switch is in REMOTE position: Attempt to clear alarm

c) REMOTE EMERGENCY TAKEOVER

Check	Action
Position of control switch (11SS)	If switch is in EMERGENCY TAKEOVER Check reason for switch position Return to NORMAL when possible If switch is in NORMAL Attempt to clear alarm

QUESTION 430.117 (SECTION 9.5.6)

Discuss the procedures that will be followed to ensure the air dryers are working properly and the frequency of checking/testing. (SRP 9.5.6, Parts II & III).

RESPONSE

Periodic (preventive) maintenance will be performed on the diesel engine air start system to ensure proper operation. System testing will be performed in accordance with Chapter 16, Technical Specifications.

Insert A here

~~Response~~

INSERT A

Procedure MD-PM.KJ-002(Q), Starting Air System Preventive Maintenance procedure provides instructions for maintaining a high degree of ~~operable~~ reliability for the air dryers in the diesel engine starting air system. The air dryers used in this application are refrigerant type. insert ~~The Preventive maintenance procedure listed above requires includes a daily check of the compressor oil level and draining the starting air storage tanks on a bi-weekly, ~~ frequency.~~

1/21

430.117-1

Insert

The performance of the dryers will be verified every 3 months by obtaining ~~driver~~ dryer outlet temperature and comparing it to manufacturer recommendations. In addition, the operations department will include in its daily rounds a check of compressor oil levels and will drain ~~draining~~ moisture from the starting air storage tanks on a weekly basis.

QUESTION 430.120 (SECTION 9.5.6)

Section 9.5.6.2 of the FSAR defines the air starting system for your plant as a high energy system. A high energy line pipe break in the air starting system of one diesel generator, plus any single active failure in any auxiliary system of any other diesel generator will result in loss of sufficient onsite AC power so that the plant cannot safely shutdown. This is unacceptable. Provide the following information:

a. Assuming a pipe break at any location in the high energy portion of the air start system, demonstrate that no damage from the resulting pipe whip, jet impingement, or missiles (air receivers, or enginer mounted air tanks) will occur on any of the four diesel generators or their auxiliary systems.

b. Section 9.5.6.2 states that the air receivers, valves, and piping to the engine are designed in accordance with ASME Section III Class 3 (Quality Group C) requirements. This is partially acceptable. We require the entire air starting system from the compressor discharge up to and including all engine mounted air start piping, valves and components be designed to Seismic Category I, ASME Section III Class 3 (Quality Group C) requirements. Show that you comply with this position. (SRP 9.5.6, Part II and III)

RESPONSE

See response to Question 430.82 (Section 3.6.1.2.1.19) for a discussion on the affects of a pipe break in the high energy portion of the air start system.

Insert 1

All of the air start piping, valves and receivers from the check valve on the air receiver inlet (including the check valve) to the air start solenoid valve on the engine are designed to Seismic Category I ASME Section III, Class 3 requirements. Refer to Figure 9.5-26 for component descriptions.

The compressor, air dryer, and piping up to the air receiver inlet check valve are not built to meet ASME code requirements because they do not serve a safety-related function. The air start valves, air distributors and the diesel engine cylinders are all pressure retaining parts, downstream of the air start solenoid valves, which do serve a safety-related function and are not ASME code items built to Seismic Category I requirements. These are specialty items that are not available as ASME components but which are built to the SDG manufacturers own critical specifications (see Table 3.2-1, Item XII.b.) Insert 3

Insert 2

INSERT 1

For the purposes of pipe break and jet impingement analysis the emergency generator and its associated auxiliaries are considered a single system. As a single system a single failure is only required to be postulated in one system. A pipe break in any one of the diesel generator rooms will not affect the remaining diesel generator units and their associated auxiliaries

2/3

Separation of the diesel generator rooms by 18 inch ~~steel~~ reinforced concrete walls protects other diesel generator units and auxiliaries from damage of pipe break in adjacent diesel generator rooms. Therefore

Insert 2

A break in ~~any of~~ the non-safety-related compressor air dryer ~~AA~~ piping up to the ASME air inlet check valve would not cause any pipe whip damage ~~due~~ to the connecting ASME piping because the non-safety-related piping is 3/4" in nominal diameter and have the same size (STET) and ~~have~~ has less than or equal wall thickness as the connecting ASME piping, therefore, damage from pipe whip is not considered as stated in SRP 3.6.2.

430.120

Insert 2 (CONT.)

The non-ASME air starting system piping has been analyzed for postulated piping failures to ensure that the resultant pipe whip will not adversely effect any safety related component.

INSERT 3.

CONNECTED TO THE ASME PORTION OF THE

THE INSTRUMENT AIR TUBING ^ ~~FOR THE~~ AIR STARTING SYSTEM IS SEISMICALLY ANALYZED CATEGORY I ~~ASME TUBING~~.

QUESTION 430.122 (SECTION 9.5.6)

You state in Section 9.5.6.2 of the FSAR that each independent starting system is designed to be capable of starting the engine five times from a pressure greater than 320 psig without recharging the starting air tanks. No information has been provided on system pressure alarms, compressor cut-in or cut-out. Provide the following.

a. Expand Section 9.5.6 of your FSAR to clarify the statement regarding the capability of the air start system of five starting cycles without recharging the air receivers. A successful diesel generator start is defined as the ability of the air start system to crank the diesel engine to the manufacturer's recommended RPM, to enable the generator to reach voltage, frequency and begin load sequencing in 10 seconds or less. With the receiver at the low pressure alarm setpoint and without recharging provide a tabulation of receiver pressure and diesel engine starting times for each of the five consecutive starts. In addition, describe the sequence of events when an emergency start signal exists. State whether the diesel engine cranks until all compressed air is exhausted, or cranking stops after a preset time to conserve the diesel starting air supply. Describe the electrical features (including interlocks) of this system in Section 8.0 of the FSAR (in the appropriate subsection).

b. Provide the pressures at which the following alarms and controls actuate: low pressure alarm, low low pressure alarm, high pressure alarm, air compressor cut-in and cut-out pressures, and all relief valve settings.

c. Verify that the low pressure alarm setpoint indicates to the operator that the compressor is not maintaining system pressure and that at this setpoint the system pressure and capacity is sufficient to start within 10 seconds the diesel generator five (5) times. (SRP 9.5.6, Part II)

RESPONSE

Section 9.5.6.2 has been revised to define the starting sequence, starting cranking cycles, system interlocks, controls setpoints, and alarms.

The basic control sequence is that the compressor cycles on at 380 psi, decreasing pressure, and off at 425 psi, increasing pressure. The low pressure alarm, to the remote panels and the control room is set at 325 psi decreasing pressure and there is

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no low-low pressure alarms. There is no high pressure alarm; however, the receiver safety relief valves relieve pressure at 475 psi.

The five starts, each in under 10 seconds at the low alarm set point condition (325 psi) was not verified in the shop performance tests. However, sufficient data exists from these tests to show an adequate air supply exists for five starts in under 10 seconds. Using the shop performance test data for the first D/G test unit (equipment No. 1DG400) which is typical of all the units, two tests were performed to demonstrate receiver capacity.

The first test verified the normal starting air sequence of both receivers and both air header banks to start the engine from a fully charged condition (425 psi) for five successful (each under 10 second) starts without recharging the receivers.

The second test simulated a failure of either one of the receivers and it's associated air header bank. The engine was started as often as possible using only one receiver and it's associated air header bank without recharging the receiver. The results of both of these tests are tabulated in Table 430.122-1. From the results of the five normal starts test only two of the starts occurred under the low alarm setpoint (325 psi) but each of these starts were well under 10 seconds. Taking the other test data for the "degraded" condition (only 1/2 of the starting air capacity case) we see nine consecutive successful starts were made below the low alarm setpoint using either the right air bank or left air bank. As indicated by the tabulated data in Table 430.122-1 two or three of the starts for either bank were in 10 seconds or less.

The test data also shows that in each bank ~~each of the~~ four starts ~~was~~ were achieved in under 10 seconds using the "compressor on" set point (380 psi). We can conclude that with both receivers in service, which is the normal design condition, the total number of starts would easily meet the five starts each in under 10 seconds criteria. This conclusion is further demonstrated by extrapolating the data of the first test from table 430.122-1. The first data point at or below the 325 psi set point is start point 4. Therefore, starts 4 and 5 provide valid data and 3 extrapolated points are necessary to demonstrate 5 start capability. From the data, a worst case 10 percent drop in starting air pressure results in an approximate 0.10 of a second increase in starting time. Based on this criter

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the following data could be extrapolated

START No.	START (PSI)	FINISH (PSI)	START TIME (SEC)	
6	255 (-Δ 10%)	229	(+0.4)	8.8
7	229 (-Δ 10%)	206	(+0.5)	9.3
8	206 (-Δ 10%)	185	(+0.6)	9.9

This expropolated data is conservative since the percent starting air pressure drop is decreasing by 10% as shown in the data and that the incremental time increase of 1/10 of a second is less than that indicated by test "B" data for the pressure ranges used. starting from the low pressure alarm point

Delete

~~Actual testing of the diesel ~~generators to demonstrate~~ five start capability is under evaluation by PSE&G due to the potential detrimental effects on overall diesel generator reliability.~~

Add → Actual demonstration of the 5 (Five) starts ~~capability~~ within 10 seconds for a diesel generator will be made part of the plant pre operational tests 3/4

TABLE 430.122-1

DATA EXTRACTED FROM COLT INDUSTRIES TEST REPORT DATED 2/82

Test	Start No	Start PSI	Finish PSI	Start Time
A) Normal Sequence	1	425 psi	380 psi	7.6 sec.
	2	380 psi	340 psi	7.8 sec.
	3	340 psi	305 psi	8.0 sec.
	4	305 psi	275 psi	8.1 sec.
	5	275 psi	255 psi	8.4 sec.
B) 1 Receiver Out 2 Cases: A Header (B Header)				
	1	425 psi (425 psi)	365 psi (365 psi)	8.9 sec (8.7 sec)
	2	365 psi (365 psi)	320 psi (325 psi)	9.2 sec (9.2 sec)
	3	320 psi (325 psi)	285 psi (290 psi)	9.6 sec (9.1 sec)
	4	285 psi (290 psi)	250 psi (260 psi)	9.9 sec (9.6 sec)
	5	250 psi (260 psi)	225 psi (235 psi)	10.3 sec (9.8 sec)
	6	225 psi (235 psi)	205 psi (215 psi)	10.8 sec (10.3 sec)
	7	205 psi (215 psi)	180 psi (190 psi)	11.3 sec (10.7 sec)
	8	180 psi (190 psi)	160 psi (170 psi)	11.9 sec (11.1 sec
	9	160 psi (170 psi)	145 psi (155 psi)	12.6 sec (11.3 sec
	10	145 psi (155 psi)	130 psi (140 psi)	14.2 sec (12.3 sec)
	11	130 psi (140 psi)	115 psi (125 psi)	15.6 sec (13.6 sec)
	12	115 psi (125 psi)	- -	Failed (Failed)

QUESTION 430.125 (SECTION 9.5.7)

For the diesel engine lubrication system in Section 9.5.7 provide the following information: 1) define the temperature differentials, flow rate, and heat removal rate of the interface cooling system external to the engine and verify that these are in accordance with recommendations of the engine manufacturer; 2) discuss the measures that will be taken to maintain the required quality of the oil, including the inspection, frequency of inspection, and replacement when oil quality is degraded; 3) describe the protective features (such as blowout panels) provided to prevent unacceptable crankcase explosion and to mitigate the consequences of such an event; and 4) describe the capability for detection and control of system leakage and the frequency it will be checked. (SRP 9.5.7, Parts II & III)

RESPONSE

1) Flow rate and heat removal rate of the safety auxiliaries cooling system (SACS) is provided in Table 9.2-4. The maximum cooling water inlet temperature to the diesel generator skid is 95°F as given in Table 9.2-3. The outlet temperature will vary with the actual heat load and actual inlet temperature of the cooling water. It has been verified that these parameters are in accordance with the recommendations of the diesel generator manufacturer.

2) The quality of the diesel generator lube oil will be maintained by complying with the surveillance standards set by the manufacturer. While the diesels are running the oil level will be checked in the lube oil sump, make-up tank, and rocker arm lube oil tank, in accordance with the plant operating procedures. When the level is checked the oil will also be checked for water and fuel contamination. Dilution can be suspected when low oil pressure exists, and blue-grey exhaust smoke may indicate excessive lube oil consumption. Degradation of lube oil quality will necessitate lube oil replacement. Periodically samples of lube oil will be sent to an oil company for analysis.

Insert A

3) See response to Question 430.134.

4) Lube oil system leakage is detected by decreasing level in the lube oil makeup tank. Low level in the makeup tank is annunciated at the remote engine control panel. External leakage would be visibly evident. Internal leakage would be evident in the diesel generator exhaust. Lube oil seepage from the crankcase is prevented by the crankcase vacuum system as described in Section 9.5.7.2. Lube oil system leakage will be controlled by proper maintenance at

1/3

Insert A ~~to~~ 430.125

2) Procurement specifications for diesel engine lubricating oil and ~~[illegible]~~ oil will incorporate the engine manufacturer's recommendations for quality, purity and lubrication properties. Sampling will be performed ~~quarterly~~ EVERY 18 MONTHS or after 750 hours of engine operation. Oil samples will be analyzed - to assure that:

1. oil degradation has not occurred
2. the oil continues to meet the specifications of MIL-L-2104B

The analysis report will determine the need for replacement of the lubricating oil.

In addition, surveillance testing demonstrates diesel engine operability and will include performance monitoring of the diesel engine lubricating oil system. The installed strainer and filter will remove sediment or other deleterious material. Strainer or filter cleaning will be performed at the onset of increased differential pressure across the strainer or filter. Residue will be analyzed to determine:

1. the source of lube oil contamination
2. the need for lube oil replacement
3. the need for cleaning the engine lube oil sump

Insert B

430.125

Insert B

The monthly diesel engine operability surveilance test required by technical specifications will require visual examination of a sample of the lube oil. This will verify that the lube oil heat exchanger is intact and water contamination of the oil has not occurred.

intervals recommended in the manufacturers operation and maintenance manuals.

3/3

QUESTION 430.127 (SECTION 9.5.7)

In Section 9.5.7.5 of the FSAR you describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine lubrication oil system and their function which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer. Describe the testing and the frequency of testing necessary to maintain a highly reliable instrumentation, control, sensors and alarm system. Describe any operator action required during alarm conditions to prevent harmful effects to the diesel engine. Discuss systems interlocks provided. Revise your FSAR accordingly. (SRP 9.5.7, Part III)

RESPONSE

← Insert A here

Diesel engine instrumentation and control testing will be performed using written procedures in accordance with the frequencies specified in the Technical Specifications. Those instruments not covered in this section will be tested in accordance with written procedures. Available January 1985.

Operator action during alarm conditions will be addressed by the appropriate alarm response procedure, OP-AR.CF-XXX series. Available January 1985.

FSAR Section 9.5.7.5 has been revised to include system interlocks.

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'A'

Response

space →

The Instrumentation and Control Department will perform calibration checks and calibrations on the instrumentat. controls, sensors and alarms of the diesel engine lubrication oil system. The calibration checks and calibrations will be performed in accordance with written procedures. The equip. and surveillance frequency is summarized in Table 430.127-

Diesel engine lubrication system operator alarm responses are summarized in Table 430.127-2.

[redacted]

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~~INSERT 430.127 "B"~~

TABLE 430.127-1

DIESEL GENERATOR LUBE OIL SYSTEM

Item ID	INST NO.		~~MANUFACTURER~~ MODEL #		FUNCTION	TYPE	Surveillance Frequency ~~100 hours~~	
					LUBE OIL (typical for all)			
KJ	LI-7557	A-D	PNEUMERCATOR	P-5	DG LO MAKE UP TANK	DC	P	P
KJ	LSH-7563	A-D	Gems	M/N 35676	DG ROCKER ARM LO LEVEL	DC	F	F
KJ	LSHL-7550	A-D	MAGNETROL	A-153-F	DG CRANK CASE LO LEVEL CONT	DC	F	F
KJ	LSHL-7558	A-D	"	"	DG CRANK CASE LO LEVEL	DC	F	F
KJ	LSL-7544	A-D	"	"	DG LO MAKE UP TANK	DC	F	F
KJ	PDI-7783	A-D	ORANGE RESEARCH	M/N 1201PG-1	DG LO FILTER ΔP	DC	P	P
KJ	PDI-7784	A-D	"	"	DG LO STRAINER ΔP	DC	P	P
KJ	PDSH-7400	A-D	U.E.	327KB	DG LO FILTER ΔP	DC	F	F
KJ	PDSH-7514	A-D	"	"	DG LO STRAINER ΔP	DC	F	F
KJ	PSL-7542	A1-D1	ASCO	SB-11	DG LO PRESS LOW	DC	F	F
KJ	PSL-7542	A2-D2	"	"	" "	DC	F	F
KJ	PSL-7542	A3-D3	"	"	" "	DC	F	F
KJ	PSL-7542	A4-D4	"	"	" "	DC	F	F
KJ	PSL-7560	A-D	"	"	DG ROCKER ARM LO PRESS LOW	DC	F	F
KJ	PT-7780	A-D	FAIRCHILD	MODEL 20	DG LO PRESS	CC	P	P
KJ	TI-6796	A-D	ASHCROFT	EI	DG LO KEEPWARM PMP DISCH.	DC	P	P
KJ	TI-6797	A-D	"	"	DG LO HEATER OUT	DC	P	P
KJ	TI-6798	A-D	"	"	DG ENG DR. LO PMP DISCH	DC	P	P
KJ	TI-6799	A-D	"	"	DG LO HX IN	DC	P	P
KJ	TI-6800	A-D	"	"	DG LO HX OUT	DC	P	P
KJ	TS-7539	A-D	ASCO	SB-11	DG LO HEATER THERMOSTAT	DC	F	F
KJ	TSH-7550	A-D	"	"	DG LO KEEPWARM TEMP	DC	F	F
KJ	TSH-8579	A-D	"	"	DG LO ENG TEMP	DC	F	F
KJ	TSL-7561	A-D	"	"	DG LO KEEPWARM TEMP	DC	F	F
KJ	TSL-7562	A-D	"	"	DG LO ENG TEMP	DC	F	F

~~All TS's ... 4 ... Q-E~~

KJ	PI-7780	A1-D1	~~ASHCROFT~~	~~1379-AS~~	LO ENGINE MANIFOLD	~~DC~~	*P	~~X~~
KJ	TI-7548	A1-D2	~~Honeywell~~	~~Dialstat~~	LO TEMP (REMOTE)	~~DC~~	*F	~~X~~

* ALL ABOVE SDG INSTRUMENTATION WILL BE CALCULATED ON AN 18 MONTH SCHEDULE.

~~Surveillance Frequency~~

~~F = 18 months~~

~~P = 36 months~~

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Table 430.127-2

~~Response to question 430.127~~

Summary of Operator Actions in Response to Diesel Engine Lubricating Oil System Alarms

High Priority

a) LUBE OIL TEMPERATURE HIGH

Check	Action
Lube oil temperature	If normal: Attempt to clear alarm If high, proceed to next step
SACS flow through cooler	Open SV 2395 if closed
Proper operation of temperature control valve	

b) LUBE OIL MAKEUP TANK LEVEL LOW

Check	Action
Tank level	If normal Attempt to clear alarm If low proceed to next step
Drain valve	Close valve if open or leaking
Proper operation of crankcase fill solenoid valve	If crankcase level is high: Close valve using control switch CS-1 Manually close valve if required
Piping and flex coupling integrity	If leaks or obstructions are present. Isolate leaks or clear obstructions if possible Notify Shift Supervisor

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c) CRANKCASE LUBE OIL LEVEL HIGH.

Check	Action
Crankcase level	If normal: Attempt to clear alarm If high, proceed to next step
Confirm solenoid makeup valve is closed	If open: Close valve using CS-7 Manually close if required
Crankcase level trend	Manually drain if required

d) CRANKCASE LUBE OIL LEVEL [redacted] LOW

Check	Action
Crankcase level	If normal. Attempt to clear alarm If low - proceed to next check
Confirm CS-7 is in AUTO	If not; Determine reason for switch out of AUTO Return switch to AUTO when possible With CS-7 in AUTO, Confirm solenoid valve is open, manually open if required to maintain crankcase level
Lube oil makeup system operable	If not: Gravity fill crankcase to clear alarm

e) LUBE OIL PRESSURE LOW PRE-TRIP

Check	Action
Operating pressure	If normal: Attempt to clear alarm
	If low, proceed to next check
Strainer and filter dP	If high, refer to applicable response
Piping integrity	If breaks or obstructions are found: attempt to isolate leak or free obstruction Notify Shift Supervisor
Valve lineup to instrumentation	Open valves if closed.
Pump operation	

f) LUBE OIL PRESSURE LOW SHUTDOWN

Check	Action
Operating pressure	If greater than 60 psi. Attempt to clear alarm If below 60 psi. Confirm diesel has shutdown. Manually shutdown if required Determine cause of low pressure

Low Priority

a) LUBE OIL TEMPERATURE LOW

Check	Action
Lube oil temperature	If normal: Attempt to clear alarm If low: proceed to next check
Operation of temperature control valve	Valve fail open, may cause low temp. under certain conditions.

b) LUBE OIL KEEP WARM TEMPERATURE HIGH

Check	Action
Heater outlet temperature	If normal. Attempt to clear alarm If high proceed to next check
Control switch positions	Heater switch (CS-36) and pump switch (CS-31) should be in AUTO, if not: Determine reason for switch position Return to AUTO when possible
Pump operating properly Heater thermostat operating	If thermostat has failed, Notify I&C and: pump running: Control temp. by cycling CS-36 to control heater pump not running: Place CS-36 in OFF to prevent heater damage

c) LUBE OIL KEEP WARM TEMPERATURE LOW

Check	Action
Heater outlet temperature	If normal: Attempt to clear alarm If low proceed to next check
Control switch positions	Heater switch (CS-36) and pump switch (CS37) should be in AUTO, if not: Determine reason for switch position Return to AUTO when possible
Heater thermostat operation	If thermostat has failed, Notify I&C
Operation of temp. control valve	Valve fails full open

d) ROCKER ARM LUBE OIL TANK LEVEL HIGH

Check	Action
Operation of tank level control valve	Confirm linkage and valve actuator are not bound
Tank overflow	If overflow occurs, manually control tank level

e) ROCKER ARM LUBE OIL PRESSURE LOW

Check	Action
Instrumentation valve lineup → Duplex R.O. filter	Open high pressure switch isolation valve if closed Swap and clean filter
Confirm motor driven pump start	If prelube pump has not started, manually start to clear alarm. 8/9
Pressure relief valve	Confirm PSV is not stuck open

f) LUBE OIL STRAINER DIFFERENTIAL PRESSURE HIGH

Check	Action
Differential pressure indicator	If normal: Attempt to clear alarm
	If high: proceed to next Check
Lube oil pressure	Confirm adequate L.O pressure is available and clean strainer when possible

g) LUBE OIL FILTER DIFFERENTIAL PRESSURE HIGH

Check	Action
Differential pressure indicator	If normal. Attempt to clear alarm
	If high: filter may be isolated and cleaned if keepwarm system is shutdown.

h) CRANKCASE PRESSURE HIGH

Check	Action
Crankcase manometer	If normal: Attempt to clear alarm
	If high. proceed to next check
Vacuum ejector piping and Flex coupling integrity	Notify Shift Supervisor of any leaks or obstructions

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QUESTION 430.128 (SECTION 9.5.7)

Provide the source of power for the diesel engine keep warm lube oil pump, rocker arm prelube oil pump, and keep warm heater, and motor characteristics, i.e, motor hp, operating voltage, phase(s) and frequency. Revise your FSAR accordingly. (SRP 9.5.7, Part III)

RESPONSE

Table 9.5-11 and Section 9.5.7.2 have been revised to include this information. The IE power source is also included in revised section 9.5.7.2.

[redacted]

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QUESTION 430.131 (SECTION 9.5.7)

You state in Section 9.5.7 of the FSAR that the lube oil used to lubricate the engine is stored in a lube oil sump tank and a 250 gallon make-up lube oil tank. During diesel engine operation a certain amount of lube oil is consumed as part of the combustion process. Since the diesel generator may be required to operate for a minimum seven days during a loss of offsite power or accident condition, sufficient lube oil should be stored in the sump and/or site to preclude diesel generator unavailability due to lack of lube oil. You state that the sump and its make-up tank contains an adequate supply of lube oil for the diesel generator to operate for a minimum of 7 days at maximum rated load. Provide the following:

a. Provide the normal lube oil usage rate for each diesel engine under full load conditions. Also provide the lube oil usage rates which would be considered excessive.

b. Show with the lube oil in the sump and the make-up tank at the minimum recommended level (low level alarm settings) that the diesel engine can operate without refilling the lube oil sump and make-up tank for a minimum of seven days at maximum rated load. If the sump and make-up tank capacity is insufficient for this condition, show that adequate lube oil will be stored onsite for each engine to assure seven days of operation at rated load.

c. Show with the lube oil in the sump at the minimum recommended level (low level alarm setting) and assuming a failure (in the closed position) of the solenoid operated valve between the make-up tank and the sump, that the diesel engine can operate without refilling the lube oil sump for a minimum of seven days at maximum rated load. If the sump capacity is insufficient for this condition, show that adequate lube oil will be stored on site for each engine to assure seven days of operation at rated load. Discuss operator action on failure of the solenoid valve to assure continued engine operation and how fuel would be added to the engine sump under this condition.

d. If the lube oil consumption rate becomes excessive, discuss the provisions for determining when to overhaul the engine. The discussion should include the procedures used and the quality of operator training provided to enable determination of excessive L.O. consumption rate. (Refer to requests 430.62.3 and 430.61 for additional requirements on procedures and training). (SRP 9.5.7, Parts II & III)

RESPONSE

a. The lube oil consumption rate for the standby diesel generator at the rated 4430 KW (6186 BHP) is 1.12 to 1.55 gallons per hour. The engine manufacturer, Colt Industries, indicates that the lube oil consumption rate does not vary appreciably with the engine load level.

The engine manufacturer indicates that a lube oil consumption rate of 3 gallons per hour would be considered excessive and should be investigated and remedied.

b. The diesel engine manufacturer recommends that the diesel engine sump be kept "topped off" in the standby condition and not allowed to be at the "minimum level" condition so that it is always ready to operate for the maximum duration required.

To raise the lube oil level in the diesel engine sump from the minimum level to the full running depth, approximatly 220 gallons of lube oil is required, which is the capacity of four 55 gallon storage drums of oil. At a consumption rate of 1.55 gallons per hour the engine can operate for 142 hours. To operate for 168 hours, an average consumption rate of 1.31 gallons per hour should not be exceeded, which is in the expected consumption range. The lube oil make up tank contains 250 gallons of oil, therefore, the make up tank can raise the sump level from minimum level to full with an additional 30 gallon in reserve. The lube oil make up tank can therefore maintain the diesel engine in the operating lube oil range for 161 hours at a consumption rate of 1.55 gallons per hour.

On site lube oil storage, for the diesel generators, will consist of twenty 55 gallon drums, which will be sufficient to maintain the diesel engines lube oil sump in the operating range for 7 days at rated power.

INSERT A

Operator action on failure of the solenoid valve to provide adequate engine lube oil sump makeup capability will be specified in the appropriate alarm response procedure. This procedure shall also provide direction to the operator as to the alternate methods of adding lube oil to the engine sump. The preferred method of alternate engine sump lube oil addition is currently being evaluated through discussions between PSE&G and the engine manufacturer. ~~Further details will be provided by July 1984.~~

move to "c"

Insert B

430.131

INSERT A

a minimum of 275 gallons of lube oil per diesel generator (twenty 55 gallon drums, total) will be stored on site for emergency makeup. The 275 gallon storage of lube oil exceeds the required lube oil make up for a seven day supply at a maximum, worst case, consumption rate of 1.55 gallons per hour.

Therefore, with the additional onsite storage of twenty 55 gallon drums of lube oil, as required by Technical Specification, there will be sufficient lube oil to operate the diesel engines for seven days from the low level sump indication.

c. Refer to response (b) above for lube oil on site storage and vendor recommended standby lube oil levels.

d. If during the course of routine SDG operation, it becomes apparent that the lube oil consumption rate is excessive, engineering and vendor services will be drawn-on to assist in identifying and correcting the abnormal condition.

Operating department shift reading sheets will require the visual verification and logging of the SDG lube oil make-up tank levels on a daily basis when the SDG is in "standby" condition. Additionally, SDG periodic test procedures will require the visual verification of lube oil make-up tank level(s), both before and after such testing is performed. Upon completion of testing, the findings will be compared against the previous months test results and the normal oil usage rates (as defined in responst to item "a"). In this manner, any appreciable changes in engine performance will be immediately identified and corrective measures taken as necessary.

Plant operator training, and subsequent requalification training, adequately stress the importance of proper equipment lubrication, logkeeping and systems training. This training, combined with "in-house" plant experience, suffices to alert operators to any abnormal diesel generator condition.

In addition, the following concerns will be addressed by July 1984:

a. Assure that a 7 day supply of lube oil is available assuming the initial level is at the low level alarm and the maximum consumption rate, or

b. Assurance that there is a 7 day supply of lube oil on site if the diesel engine does not have sufficient lube oil to operate for 7 days at the maximum consumption rate, at the low level alarm.

c. Assurance that the lube oil sump can be filled assuming a failure of the solenoid operated makeup valve and no makeup tank available.

Insert B

Lube oil can be directly added to the lube oil sump by removing the crankcase dip stick and manually adding lube oil with the aid of a funnel.

QUESTION 430.135 (SECTION 9.5.7)

You state in Section 9.5.7.2 of the FSAR and shown in Figure 9.5-27 that lube oil is added to the diesel generator lubricating oil system from a 250 gallon lube oil make-up tank. Provide a discussion on the measures that have been taken to prevent entry of deleterious materials in the lube oil make-up tank. Also discuss what measures have been taken to prevent entry of deleterious materials into the lube oil make-up tank due to operator error during filling operation.

In addition address the following:

a. Discuss the means for detecting or preventing growth of algae in the lube oil make-up tank. If it were detected, describe the methods to be provided for cleaning the affected storage tank.

b. Provide an explicit description of proposed corrosion protection for the lube oil make-up tank. Where corrosion protective coatings are being considered for the piping and tanks (both external and internal) include the industry standards which will be used in their application.

c. Figure 9.5-27 of the FSAR shows that the diesel generator lube oil make-up tank is provided with an individual fill, vent, and emergency pressure relief vent lines. Indicate where these lines are located (indoor or outdoor) and the height these lines are terminated above finished ground grade. If these lines are located outdoors discuss the provisions made in your design to prevent entrance of water into the make-up tank during adverse environmental conditions, and the tornado missile protection provided.

d. Assume an unlikely event has occurred requiring operation of a diesel generator for a prolonged period that would require replenishment of lube oil in the sump without interruping operation of the diesel generator. What provisions have been made in the lube oil transfer system design from the lube oil make-up tank to the engine sump to prevent carryover of sediment, water, and scale that may accumulate in the clean lube oil storage tank. What provisions have been made for the removal of accumulated sediment, water, and other deleterious material that may collect at the bottom of the storage tank. (SRP 9.5.7, Parts II & III)

RESPONSE

Insert A →

a. The 250 gallon lube oil make-up tank is provided with inspection ports, one upper and one lower. If algae growth is detected in the lube oil make up tanks a lube oil addative can be added to eliminate the algae and to prevent further growth.

Insert B →

Inspections of the lube oil makeup tanks will be performed during each refueling outage.

b. The standby diesel generator lube oil make up tank material is carbon steel, SA 515 GR. 70. The exterior of the tank is coated using Colt Industries standard protection system. The system consists of a primer of Gordon Bartells 13409, yellow, and a finish coat of Gordon Bartells 14-811, suede grey, both applied according to the paint manufactures recommendations. The interior of the tank is not coated because the lube oil is non-corrosive. and the tank is expected to be maintained in the full condition. } delete

INSERT C →

c. The vent and emergency pressure relief vent are terminated indoors, directly above the tank. The fill line is routed to the outside (west) of the auxiliary building at elevation 105 feet 0 inches, 3 feet above grade. The line is capped and has a normally closed isolation valve located in the building to prevent water from entering the line. It is not protected from missiles and tornadoes because it is not safety-related.

Insert D → d. The lube oil makeup tank bottom is hemispherical. The line to the diesel generator sump is approximately 1.75 inches above the bottom of the dish. Should there be any carry over into the transfer line, it would be trapped in the strainer and/or filter before (after) entering the engine sump.

A normally closed drain valve is provided at the low point of the tank, reference Figure 9.5-27. The drain valve will be opened in accordance with plant operating procedures (deleterious) to remove any sediment, water or other material that may accumulate in the bottom of the tank.

The following concerns will be addressed by July, 1984:

a. Description of corrosion protection

b. Effects of sedimentation

c. Algae detection and control in the lube oil make up tank. } delet

this item is in 430.135-3

Insert A

Deleterious material is prevented from entering the diesel engine lube oil make-up tank by:

1. Procuring high quality, high purity lube oil with ~~pr~~ lubricating properties ~~as required~~ in accordance with the manufacturer's recommendations.
2. Insuring that ~~additions~~ filling operations to increase make-up tank level are performed through the installed basket strainer in the fill line.

The lube oil make-up tank conservation vent permits tank venting when required and prohibits airborne impurities from continuously entering the tank.

Make-up tank filling will be accomplished in accordance with a written procedure. A controlled copy of the procedure will be posted in the vacinity of the lube oil fill line. The lube oil fill line will be labaled to identify the fill line connection purpose and a reference to the applicable procedure.

Insert B

a. Algae formation may occur due to condensate accumulation in the make-up lube oil tank. Prior to diesel engine monthly operability testing the lube oil make-up tank drain will ~~p~~ be ~~opede~~ opened to remove any water, sediment, algae or other deleterious material. If lube oil purity is degraded any of the following ~~actions~~ methods can be implemented to restore lube oil purity in the make-up tank:

1. All deleterious material may be removed by draining lube oil through the drain line.

2. The lube oil make-up tank can be drained, cleaned and refilled with fresh lube oil.

3. A chemical additive can be added to remove algae or other biological growth if advised by a Tribology specialist.

INSERT C

430.135

Corrosion of the SDG lube oil makeup tank in the unfilled areas is prevented by lube oil vapor coatings, normally found on unflooded sections of lube oil tanks.

Prevention of corrosion of the lower head of the SDG lube oil makeup tank due to ~~water~~ moisture accumulation is addressed in the second para. to part d of this response.

Insert ~~C~~ D 430.~~135~~ ~~/~~ 135

D. In accordance with technical specifications, twenty 55 gallon drums of diesel engine lubricating oil are stored and available for use if diesel operation is required for a prolonged period. Additional information on lube oil make up requirements is provided in the response to question 430.131.

QUESTION 430.137 (SECTION 9.5.7).

You state in Section 9.5.7.1 of the FSAR under specific design criteria that the temperature of the lubricating oil is automatically maintained above a minimum value by means of an independent recirculation loop including its own pump and heater, to enhance first try starting reliability of the emergency diesel generator when in the standby condition. The rocker arm lubrication system is an independent subsystem of the diesel lube oil system which is connected to the main system by a float valve in the rocker arm oil reservoir. From the information available, it appears that the lube oil in the rocker arm lubrication system will never be preheated unless the oil level is low enough to open the float valve. If this is the case what means have you provided for preheating the rocker arm lubricating oil or justify why preheating is unnecessary. (See request 430.145 for conditions when preheating may be necessary.) (SRP 9.5.7, Parts II and III)

RESPONSE

The rocker arm lubricating oil ~~will~~ is not ~~be~~ pre-heated. This system was designed by the diesel engine manufacturer and based upon their many years of experience, they have determined that ~~preheating of rocker arm oil is not necessary.~~ The manufacturer's recommendation is that the rocker arm prelube pump be run once a day for 5 minutes as is discussed in response to Question 430.130.

Specific heating (pre-heating) or cooling of the rocker arm lube oil system is not required, ~~And the ...~~

Since the rocker arm section of the engine is insensitive to oil viscosity. The main requirement is that there be a supply of oil. The rocker arm area is heated by its proximity to the cylinder heads which are part of the jacket water system.

Add

And the other preheating keep warm engine systems are all sized to allow for all environmental conditions as described in Question 430.145

QUESTION 430.138 (SECTION 9.5.7)

In Sections 9.5.7.3 and 9.5.7.5 of the FSAR you discuss the level alarms associated with the lube oil system. You state that "the rocker arm lube oil reservoir level is monitored for high level and the level is maintained by a level control valve." No mention is made of a reservoir low level alarm. A failure of the level control valve to maintain lube oil level in the rocker arm reservoir could result in inadequate or no lubricating oil for the rocker arms, leading to diesel generator unavailability and/or failure. This is an unacceptable condition. Provide a low level alarm for the rocker arm lube oil reservoir. (SRP 9.5.7, Part III)

RESPONSE

The rocker arm lubrication system is also monitored by a rocker arm lube oil pressure low switch (KPLA), which would initiate an alarm in the event that insufficient pressure is available in the rocker arm lube oil system due to any of the following causes:

a. the filters are plugged,

b. the system has run low on oil level due to malfunction of the automatic level fill valve,

c. the engine driven pump (or its drive) has failed.

Upon the alarm, the motor driven rocker arm lube oil pump is also started. If the problem was caused by a or b, the operator must take appropriate action.

The function of the high level alarm switch is to alert personnel that:

a. Fluids other than oil, such as a fuel oil leak at an injector, or a water leak in the cylinder head (between the jacket water system and rocker arm lube oil drain system) have entered the rocker arm lube oil system.

b. The lube oil supply valve (float valve) has malfunctioned (open).

In either case, the operator must investigate and remedy the problem. Therefore a low level alarm for the rocker arm lube oil reservoir is not required.

See attached for con't response

✓

1/2

e. Withstand wind, tornadoes, floods, and missiles

f. Permit testing of active system components during plant operation.

The SDG lubrication system is designed to Seismic Category I requirements and complies with IEEE Standard 387. The quality group classification and corresponding codes and standards that apply to the design of the system are discussed in Section 3.2. Compliance with Regulatory Guides 1.9, 1.115, and 1.117 is discussed in Section 1.8. Compliance with GDC 2, 4, 5, and 17 is discussed in Section 3.1. The SDG lubrication system is in compliance with the recommendations of NUREG CR-0660.

9.5.7.2 System Description

A Class 1E ac power source of the same channel as the SDG is used to supply power to the immersion heater and the rocker arm prelube pump.

The SDG lubrication system consists of two subsystems, the engine lube oil system and the rocker arm lube oil system. The engine lube oil system consists of an engine-driven lube oil pump, a suction strainer, a lube oil heat exchanger, a Class 1E motor-driven prelube/keep-warm pump, a Class 1E immersion heater, a wye strainer at the motor-driven pump suction, a simplex strainer, a simplex filter, and a lube oil makeup tank. The rocker arm lube oil system consists of an engine-driven rocker arm lube oil pump, a Class 1E motor-driven rocker arm prelube pump, a rocker arm lube oil reservoir, and a duplex rocker arm lube oil filter. Major component design parameters for these two systems are shown in Table 9.5-11. The SDG general arrangement is shown on Figures 1.2-33 and 1.2-35. A schematic diagram of the lubrication system is shown on Figures 9.5-27 and 9.5-28.

Each SDG crankcase is the main source of lube oil for the engine and rocker arm lube oil systems. If the lube oil level drops below set limits, a solenoid valve actuated by a low level switch in the crankcase opens, and lube oil flows by gravity from the makeup tank into the crankcase. A high level switch actuates valve closure. Degraded oil from the engine crankcase can be drained for reclaiming by the motor-driven pump of the engine lube oil system via a three-way valve on the pump discharge and a drain header. Lubricating oil quality is maintained through the use of full flow filters and strainers and is verified by periodic laboratory testing.

Each crankcase is provided with a built-in crankcase evacuation system using an ejector to maintain a negative pressure in the

2/2

430.138

Response (Cont'd)

It is Colt's position that the rocker arm low lube oil pressure alarm is sufficient to determine a problem in this system. The unit could probably run for several minutes with a "low pressure" as long as there was some pressure to maintain flow.

If the loss of pressure was caused by a failure of the float level valve to admit oil, oil could be added to the tank by hand. This is basically a closed system and the rate of oil consumption is very low.

Based on the above information, Colt does not feel their design requires a low level alarm for the rocker arm lube oil reservoir.

Additionally, Operations Department procedures will include instructions to have the rocker arm lube oil tank level observed once per shift during diesel continuous operations and weekly during all other times.

QUESTION 430.140 (SECTION 9.5.8)

Describe the instrumentation, controls, sensors and alarms provided in the design of the diesel engine combustion air intake and exhaust system and their function which alert the operator when parameters exceed ranges recommended by the engine manufacturer. Describe the testing and frequency of testing necessary to maintain a highly reliable instrumentation, control, sensors, and alarm system and where the alarms are annunciated. Describe any operator action required during alarm conditions to prevent harmful effects to the diesel engine. Discuss systems interlocks provided. Revise your FSAR accordingly. (SRP 9.5.8, Part III)

RESPONSE

Two temperature indicating switches are provided on each diesel generator unit to monitor combustion air intake temperature; a high temperature sensed by both switches will initiate an alarm as described in Section 9.5.8.5. The exhaust gas and engine cylinder temperatures are monitored by thermocouples which are selectively indicated on a pyrometer located on the remote engine control panel by operation of the temperature selector switch; also located on this panel. These devices perform indication and/or alarm function only and no system interlock is provided. The instrumentation, sensors and alarms are described in Section 9.5.8.5.

The testing of diesel generator instrumentation and control will be performed using written procedures and in accordance with the frequencies specified in the Hope Creek Technical Specifications. Those items not covered by that section will be tested in accordance with other written procedures. Available January 1985.

Operator actions during alarm conditions will be addressed by the appropriate alarm response procedures, OP-AR.KJ-XXX series. Available January 1985.

Insert A here

1/4

INSERT A

The Instrumentation and Controls Department will perform calibration checks and calibrations on the instrumentation, controls, sensors and alarms of the diesel engine combustion air intake and exhaust system. The calibration checks and calibrations will be performed in accordance with written procedures. The equipment and surveillance frequency is summarized in Table 430.140-1.

Diesel engine combustion air intake and exhaust system operator response to alarm conditions is summarized in Table 430.140

~~Insert A~~ B

(TABLE 4.0-1(?)

CRANK CASE VACUUM, AIR INTAKE & EXHAUST SYSTEMS.

System ID ✓	INST NO		~~MANUFACTURER~~	~~MODEL NO~~	FUNCTION	~~PRIOR TEST~~	Surveillance Frequency* ~~LAST TEST~~	
KJ	TSH-6603	A-D	KS	J302	CRANK CASE PRESS.	DC	F	F
KJ	TI-6600	A-D	ASHCROFT	EI	INTAKE AIR TEMP	DC	P	P
KJ	TI-8269	A-D	"	"	LEFT TURBO OUT	DC	P	P
KJ	TI-8270	A-D	"	"	RIGHT TURBO OUT	DC	P	P
KJ	TI-8271	A-D	"	"	AIR MANIFOLD LEFT	DC	P	P
KJ	TI-8272	A-D	"	"	AIR MANIFOLD RIGHT	DC	P	P
KJ	TSH-6605	A1-D1	ATCO	53-11	COMBUSTION AIR TEMP	DC	F	F
KJ	TSH-6605	A2-D2	"	"	" " "	DC	F	F
KJ	TI-8585	A-D	ALDOR(?)	FA	CYLINDER EXHAUST TEMP	DC	F	F
KJ	PG-6603	A-D	MERIAM(?)	10AA25FF(?)	CRANK CASE VACUUM	DC	P	—

* THE ABOVE SDG INSTRUMENTATION WILL BE CALIBRATED ON AN 18 MONTH CYCLE.

* Surveillance Frequency

F = 18 months

P = 36(?) months

3/4

TABLE 430.140-2

~~Response to Question 430.140~~

Summary of Operator Actions in Response to Diesel Engine Combustion Air Intake and Exhaust System Alarms.

High Priority

a) COMBUSTION AIR TEMPERATURE HIGH

Check	Action
Intercooler cooling water temp and pressure	If abnormal. Check piping for leaks and obstructions Ensure: makeup water is available from the jacket water expansion tank Intercooler cooling pump is operable SACS is available to the intercooler heat exchanger

QUESTION 430.142 (SECTION 9.5.8)

Discuss the provisions made in your design of the diesel engine combustion air intake and exhaust system to prevent possible clogging, during standby and in operation, from abnormal climatic conditions (heavy rain, freezing rain, dust storms, ice snow and drifting snow) that could prevent operation of the diesel generator on demand. (SRP 9.5.8, Parts II & III)

RESPONSE

Insert 1

The standby diesel generator intake system is protected from rain ice, and snow, by a louvered Seismic Category I enclosure as discussed in Sections 9.5.8.2 and 9.5.8.3. The air filter is capable of removing 95% of 25-micron particles and 70% of 5-micron particles as indicated in Table 9.5-13.

INSERT 2 ~~The standby diesel generator exhaust duct is provided with a hood cover and screen to prevent possible clogging from abnormal climatic conditions.~~ Section 9.5.8.3 has been revised to clarify the system design.

[redacted]

1/5

①

430.142

INSERT 1 Each missile proof opening is covered by a 5 ft wide by 10 ft high framed louver as shown in figure 430.142-1. The spacing between the storm blading allows for a free flow area of at least 38 percent, based on manufacturers information. Since the opening is 50 square feet then 38 percent of this area is 19 square feet, which is 6 times greater than the area of the intake piping, which is 3.14 square feet. The louver design is designed to exceed the icing weather conditions described in section 2.3.1.2.1.6.

2/5

430.142 (cont)

INSERT 2

Missile protection for the standby diesel generator exhaust stack is discussed in the response to question 430.150.

The standby diesel generator exhaust stack penetrates the roof at the 198 foot elevation of the auxiliary building. The missile enclosure above the stack outlet has a continuous circumferential opening approximately five feet above the roof elevation. The opening is protected from rain, snow and ice by a pyramid

3

430.142 (cont)

shaped hood, which has a minimum two foot overhang.

QUESTION 430.142

INSERT 2 (CONT.)

Section 2.3.2.1.4 indicates a maximum measured 24 hr snowfall of 22.0 inches, from the Wilmington NWS records. The bottom of the SDG exhaust hood is 4'4" inches above the roof elevation of 198'0". With the maximum snow level of 22 inches, the snow will be ~~X~~ 18 inches below the exhaust stack outlet, assuming no drifting occurs. ~~If drifting snow occurs the snow levels on the roof in these areas will be unpredictable. Therefore, during drifting snow conditions administrative procedures will be taken to insure that the snow level does not block the SDG exhaust stack.~~

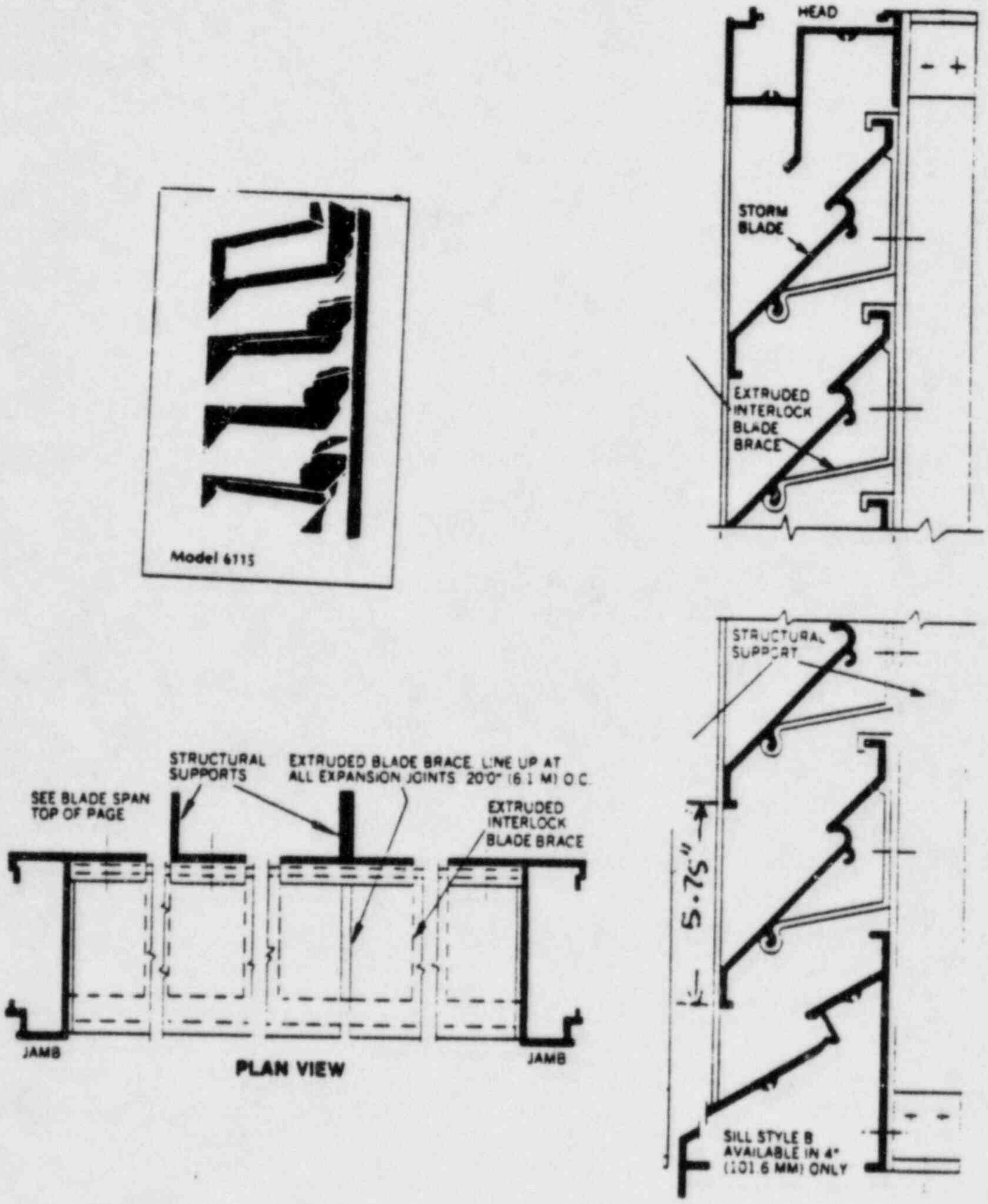
To accommodate the potential for drifting snow conditions Station operations personnel will control snow buildup in the area of the SDG exhausts. An expected snow accummulation of 12" or more, as reported by the National Oceanographic and Atmospheric Agency (NOAA), plus a visual observation of snow on site, will trigger the following actions:

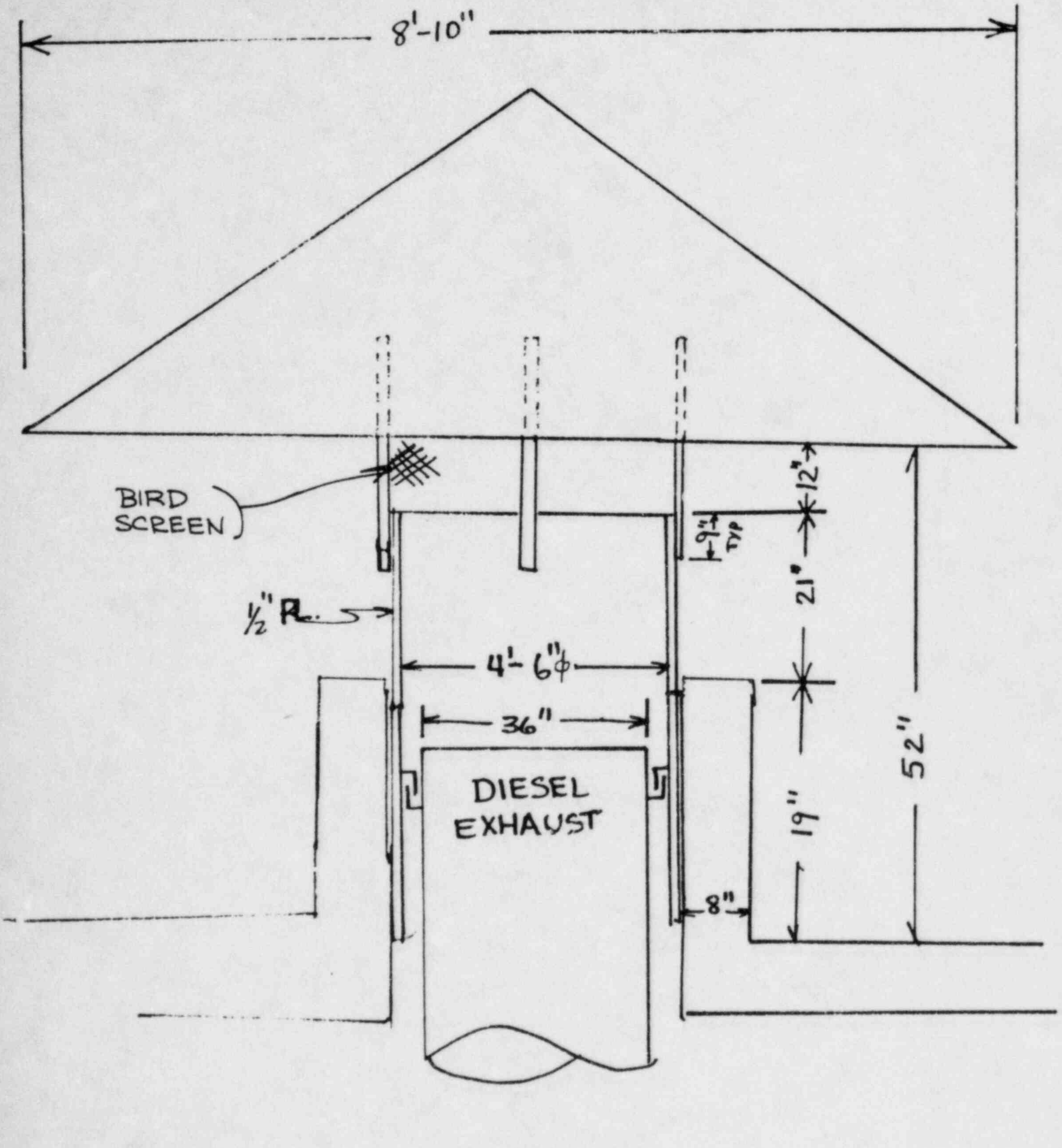
1. Snow buildup in the vicinity of the SDG exhausts will be monitored on an hourly basis.

2. Snow removal will commence when the level reaches 36" in the immediate area of the SDG exhausts.

The space remaining between the 36" snow level and the 4'-4" bottom of stack opening provides adequate clearance for proper diesel engine exhaust.

Figure 430.142-1





430.142

QUESTION 430.145 (SECTION 8.3.1, 9.5.6)

Diesel generators for nuclear power plants should be capable of operating at maximum rated output under various service conditions. Under no load and light load operations, the diesel generator may not be capable of operating for extended periods of time under extreme service conditions or weather disturbances without serious degradation of the engine performance. This could result in the inability of the diesel engine to accept full load or fail to perform on demand. Provide the following:

a. The environmental service conditions for which your diesel generator is designed to deliver rated load including the following:

Service Conditions

(a) ambient air intake temperature range-°F

(b) humidity, max-%

b. Assurance that the diesel generator can provide full rated load under the following weather disturbances:

(1) A tornado pressure transient causing an atmospheric pressure reduction of 3 psi in 1.5 seconds followed by a rise to normal pressure in 1.5 seconds.

(2) A low pressure storm such as a hurricane resulting in ambient pressure of not less than 26 inches Hg for a minimum duration of two (2) hours followed by a pressure of no less than 26 to 27 inches Hg for an extended period of time (approximately 12 hours).

c. In light of recent weather conditions (subzero temperatures), discuss the effects low ambient temperature will have on engine standby and operation and effect on its output particularly at no load and light load operation. Will air preheating be required to maintain engine performance? Provide curve or table which shows, performance verses ambient temperature for your diesel generator at normal rated load, light load, and no load conditions. Also provide assurance that the engine jacket water and lube oil preheat systems has the capacity to maintain the diesel engine at manufacturer's recommended standby temperatures with minimum expected ambient conditions. If the engine jacket water and lube oil preheat systems' capacity is not sufficient to do the above, discuss how this

1/5

equipment will be maintained at ready stand-by status with minimum ambient temperature.

d. Provide the manufacturer's design data for ambient pressure vs engine derating.

e. Discuss the effects of any other service and weather conditions will have on engine operation and output, i.e., dust storm, air restruction, etc. (SRP 8.3.1, Parts II & III; SRP 9.5.5, Part III, SRP 9.5.7, Parts II & III; and SRP 9.5.8, Parts II & III)

RESPONSE

a. The environmental service conditions are:

(a) Ambient air intake range: outdoor

winter	-4°F	RH	25 to 95%
summer	+102°F	RH	25 to 95%

(b) The diesel engine is not sensitive to humidity. The unit will tolerate, with no effect on load capability or rating, any relative humidity from 0 to 100%.

b. 1&2, & c. Engine Rating/Capability During Adverse Weather Conditions

Engines are rated on a basis of the long term effects on the life of the engine due to altitude, ambient temperatures, and so forth. Hurricanes and tornadoes are considered short term conditions and are of no consequence to the rating or capability of these units.

The diesels are designed to operate over the full range of operating loads under the environmental conditions described in part a.(a) & (b).

INSERT 1

d. A curve of the 12CR.PC2 class engine derating for ambient pressure (altitude) is attached (Figure 430.145-1). It should be noted that this curve is applicable on the long term basis - altitude derating - and is not applicable to short term phenomena such as tornadoes, hurricanes, tropical storms, or other weather depresssions.

e. The Colt, the diesel engine manufacturer confirms that as long as the unit is adequately maintained (air intake filters kept cleaned, etc), there are no other conditions adverse to the engine. Colt's current position on low or no load operation as it relates to environmental conditions is given in the attached ~~Table~~ Letter 430.145-1

It should be noted that the 12 hour time limit referred to in Question 430.111 is for intermittant non-continuous low/no load testing. The 24 hour time limit in their latest letter is for continuous (no starting & stopping) low/no load operation.

2/5

430.145

INSERT 1

It is Colt's position that there is enough conservatism in the operating instructions given on low load (idle) operation, as stated in the revised response to Question 430.111 and documented in Colt's letter from Mr. V. T. Stonehocker to Mr. Clemenson (NRC) dated September 11, 1975, that the SDG should operate successfully regardless of any ambient temperature conditions expected at the HCGS site.

The SDG area ventilation system is described in Section 9.4.6. The SDG rooms receive air from the SDG area corridor through a 4 ft by 3 ft louver, which is equipped with a fire damper. The air is drawn out of the SDG rooms by the SDG area exhaust system. The air supplied to the corridor is heated, to 60°F, during cold weather. If the electric heater fails to maintain this temperature ~~and the temperature fa~~ a low supply air temperature to the diesel area supply units alarms at 40°F on a local panel and is indicated at the main control room annunciator panel, reference 9.4.6.5. THE OPERATOR RESPONSE TO THIS ALARM WILL BE TO INVESTIGATE AND INITIATE CORRECTIVE ACTION ASSOCIATED WITH THE HVAC SYSTEM FAILURE.

INSERT A → If in the unlikely event the standby diesel engine keepwarm system fails and the system temperatures fall to the low temperature set point, an alarm will be sounded in the control room. Operating/Maintenance personnel will be dispatched to investigate and remedy the problem. ~~[illegible]~~

If the engine keepwarm system is unable to be placed back into

INSERT 1 (Continued)

service and/or the HVAC fails to keep the room at the proper temperature, the engine can be started to maintain temperatures in the standby range, UNTIL CORRECTIVE MAINTENANCE IS COMPLETED.

It is not anticipated that the Colt Industries supplied diesel engines would not start or operate at temperatures below the specified low temperature. Colt Industries has supplied diesels having similar equipment, which have performed successfully in much more severe climates.

INSERT A

430.145

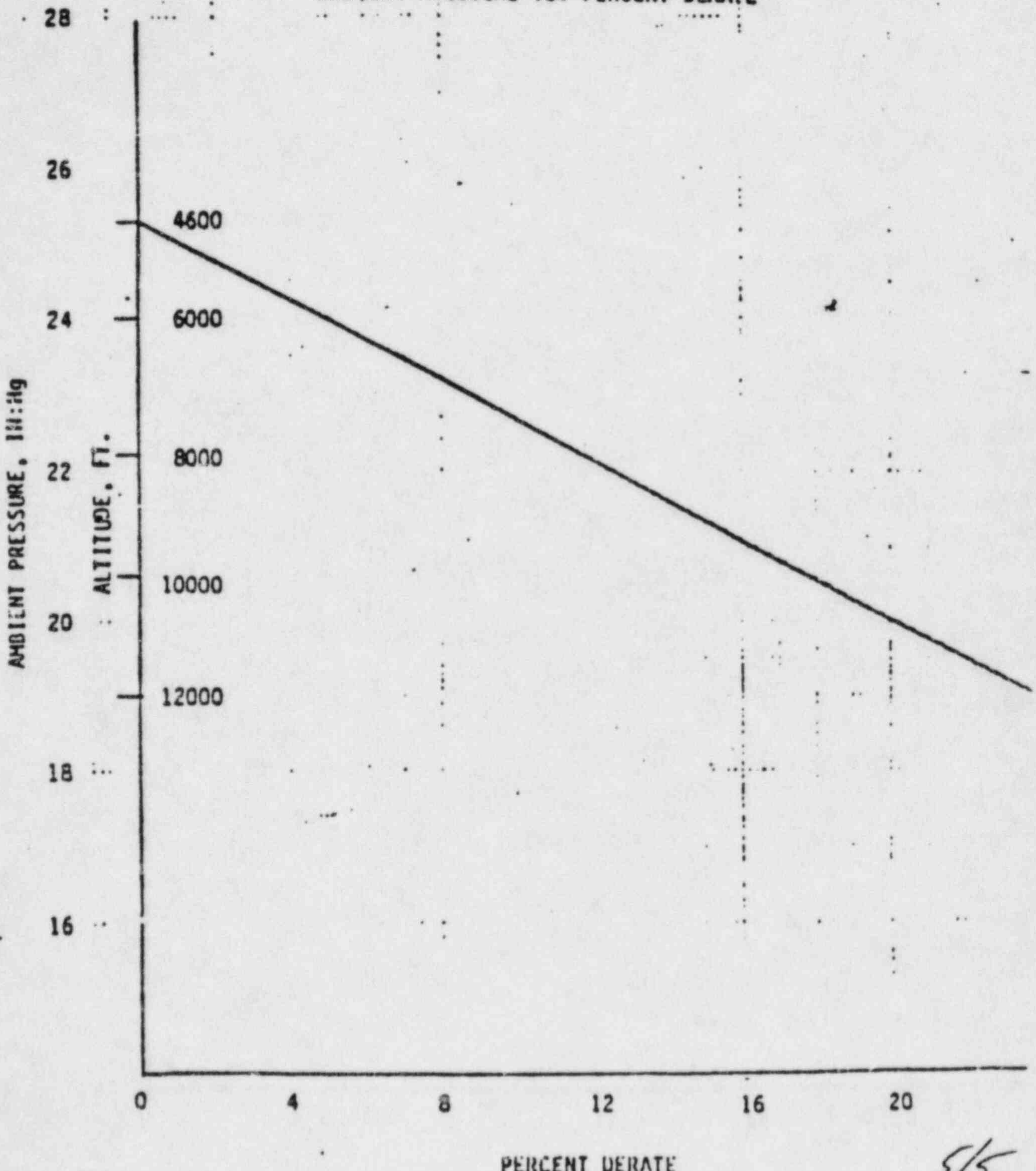
The SDG area corridor and SDG rooms will be above the 40°F alarm set point of the SDG area supply ventilation due to the large thermal capacitance of the SDG corridor and the SDG rooms. The residual heat in the corridor and SDG rooms, including the SDG keepwarm systems, will allow the operation and/or maintenance personnel time to:

1. restore normal SDG area heating system,

2. raise ~~and~~ and maintain SDG room temperature using portable heating systems.

0261889

12 CYL. PC2 (4238KW AT 514 RPM)
AMBIENT PRESSURE VS. PERCENT DERATE



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10/20/83 R.C.H.

430.145 (4/84)

FIGURE 430.145-1

Letter 430-145.1 1/2

Colt Industries Fairbanks Morse Engine Division

September 6, 1984

Bechtel Power Corporation
Fifty Beale Street
P.O. Box 3965
San Francisco, CA 94119

Attention: K. W. Burrowes

Dear Mr. Burrowes:

I submit the following information in response to Agenda Item 17 of the meeting between PSE&G's Hope Creek Project and the NRC Power Systems Branch of September 6, 1984 (Reference NRC Question 430.62).

The information provided reaffirms Colt's position stated by my letter of September 11, 1975 to Mr. Fred Clemenson (NRC).

Colt's position is as expressed in that letter with only slight modification as stated below:

1. The method of operation described is irrespective of the engine air intake (outside ambient) temperatures. Essentially, once the engine is in operation and the lube oil and jacket water temperatures are being maintained by action of those systems' thermostatic control valves, the engine can be operated indefinitely at idle or low load (less than 20% load) conditions providing that if the engine were to be operated at periods of time extending over 24 hours, and the loads were such that they did not exceed 20% of the engine rating, the engine should be run at above 50% load for at least one hour in each 24 hour period in order to minimize the accumulation of products of combustion and lubrication in the exhaust system. Above the 20% rating, the engine may be run continuously as required. It is also recommended that the engine parameters be monitored closely, and logged at least daily, so as to be able to discover any problems early. Changes in cylinder exhaust temperatures would be of particular interest.

2. There exists no mechanical limitation within the engine or any of its supporting systems which would limit operation over extended periods of time at rated speed between no load and rated load with the exception of the possible accumulation of unburned products of combustion and lube oil products in the exhaust system at the lower loads.

430-145 2/2

3. The consequences of allowing accumulation of combustion and lube oil products in the exhaust system would be primarily two fold.

   a. The possibility of fire hazard on resuming high load operation with exhaust temperatures above the flash point of the products accumulated.

   b. Fouling of the exhaust side of the turbocharger with probable effects on their performance and/or vibration due the deposits upsetting the balance of the rotating assemblies.

Sincerely,

Van Stonehocker
Colt Industries

VS/jk